BIK II (DICK SHERIDAN)

PROGRAM

"RETREAD"

SILVER'S COPY

FP2P 9
ACCO

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P0038    VERB DEFINITIONS


R0039     REGULAR VERBS
R0040    01   DISPLAY OCTAL COMP 1 (R1)
R0041    02   DISPLAY OCTAL COMP 2 (R1)
R0042    03   DISPLAY OCTAL COMP 3 (R1)
R0043    04   DISPLAY OCTAL COMP 1,2 (R1,R2)
R0044    05   DISPLAY OCTAL COMP 1,2,3 (R1,R2,R3)
R0045    06   DECIMAL DISPLAY
R0046    07   DP DECIMAL DISPLAY (R1,R2)
R0047    10   SPARE
R0048    11   MONITOR OCT COMP 1 (R1)
R0049    12   MONITOR OCT COMP 2 (R1)
R0050    13   MONITOR OCT COMP 3 (R1)
R0051    14   MONITOR OCT COMP 1,2 (R1)
R0052    15   MONITOR OCT COMP 1,2,3 (R1,R2,R3)
R0053    16   MONITOR DECIMAL
R0054    17   MONITOR DP DECIMAL (R1,R2)
R0055    20   SPARE
R0056    21   LOAD COMP 1 (R1)
R0057    22   LOAD COMP 2 (R2)
R0058    23   LOAD COMP 3 (R3)
R0059    24   LOAD COMP 1,2 (R1,R2)
R0060    25   LOAD COMP 1,2,3 (R1,R2,R3)
R0061    26   SPARE
R0062    27   FIXED MEMORY DISPLAY
R0063    30   REQUEST EXECUTIVE
R0064    31   REQUEST WAITLIST
R0065    32   C(R2) INTO R3, C(R1) INTO R2
R0066    33   PROCEED WITHOUT DATA
R0067    34   TERMINATE CURRENT TEST OR LOAD REQUEST
R0068    35   TEST LIGHTS
R0069    36   FRESH START
R0070    37   CHANGE MAJOR MODE
R0071    END OF REGULAR VERBS
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G. Silver

IL7-146 (OFFICE)   (LAB)

Ext 261[illegible]   1[illegible]

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P0105  NORMAL NOUNS                                     SCALE AND DECIMAL POINT
R0107  00  NOT IN USE
R0108  01  SPECIFY MACHINE ADDRESS (FRACTIONAL)         (.XXXXX)
R0109  02  SPECIFY MACHINE ADDRESS (WHOLE)              (XXXXX.)
R0110  03  SPECIFY MACHINE ADDRESS (DEGREES)            (XXX.XXDEGREES)
R0111  04  SPECIFY MACHINE ADDRESS (HOURS)              (XXX.XXHOURS)
R0112  05  SPECIFY MACHINE ADDRESS (SECONDS)            (XXX.XXSECONDS)
R0113  06  SPECIFY MACHINE ADDRESS (GYRO DEGREES)       (XX.XXXDEGREES)
R0114  07  SPECIFY MACHINE ADDRESS (Y OPT DEGREES)      (XX.XXXDEGREES)
R0116  10  CHANNEL TO BE SPECIFIED
R0117  11  SPARE
R0118  12  SPARE
R0119  13  SPARE
R0120  14  SPARE
R0121  15  INCREMENT MACHINE ADDRESS                    (OCTAL ONLY)
R0122  16  TIME SECONDS                                 (XXX.XXSECONDS)
R0123  17  TIME HOURS                                   (XXX.XXHOURS)
R0124  20  ICDU                                         (XXX.XXDEGREES)
R0125  21  PIPAS                                        (XXXXX.PULSES)
R0126  22  NEW ANGLES I                                 (XXX.XXDEGREES)
R0127  23  DELTA ANGLES I                               (XXX.XXDEGREES)
R0128  24  DELTA TIME (SECONDS)                         (XXX.XXSECONDS)
R0129  25  CHECKLIST                                    (XXXXX.)
R0130  26  PRIO/DELAY, ADRES, BBCON                     (OCTAL ONLY)
R0131  27  SELF TEST ON/OFF SWITCH                      (XXXXX.)
R0132  30  STAR NUMBERS                                 (XXXXX.)
R0133  31  FAILREG                                      (OCTAL ONLY)
R0134  32  DECISION TIME (MIDCOURSE)                    (XXX.XXHOURS (INTERNAL UNITS = WEEKS))
R0136  33  EPHEMERIS TIME (MIDCOURSE)                   (XXX.XXHOURS (INTERNAL UNITS = WEEKS))
R0138  34  MEASURED QUANTITY (MIDCOURSE)                (XXXX.XKILOMETERS)
R0139  35  ROLL, PITCH, YAW                             (XXX.XXDEGREES)
R0140  36  LANDMARK DATA 1                              (OCTAL ONLY)
R0141  37  LANDMARK DATA 2                              (OCTAL ONLY)
R0142  40  SPARE
R0143  41  SPARE
R0144  42  SPARE
R0145  43  SPARE
R0146  44  SPARE
R0147  45  SPARE
R0148  46  SPARE
R0149  47  SPARE
R0150  50  SPARE
R0151  51  SPARE
R0152  52  GYRO BIAS DRIFT                              (.BBXXXXXMILLIRAD/SEC)
R0154  53  GYRO INPUT AXIS ACCELERATION DRIFT           (.BBXXXXX(MILLIRAD/SEC)/(CM/SEC SEC))
R0156  54  GYRO SPIN AXIS ACCELERATION DRIFT            (.BBXXXXX(MILLIRAD/SEC)/(CM/SEC SEC))
R0158  END OF NORMAL NOUNS
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R0159   MIXED NOUNS                                                SCALE AND DECIMAL POINT
R0161   55  OCDU                                                   (XXX.XXDEG, XX.XXXDEG)
R0163   56  UNCALLED MARK DATA (OCDU & TIME(SECONDS))              (XXX.XXDEG, XX.XXXDEG, XXX.XXSEC)
R0165   57  NEW ANGLES OCDU                                        (XXX.XXDEG, XX.XXXDEG)
R0167   60  IMU MODE STATUS (IN3, WASKSET, OLDERR)                 (OCTAL ONLY)
R0169   61  TARGET AZIMUTH AND ELEVATION                           (XXX.XXDEG, XX.XXXDEG)
R0171   62  ICDUZ AND TIME                                         (XXX.XXDEG, XXX.XXSEC)
R0173   63  OCDUX AND TIME                                         (XXX.XXDEG, XXX.XXSEC)
R0175   64  OCDUY AND TIME                                         (XX.XXXDEG, XXX.XXSEC)
R0177   65  SAMPLED TIME (HOURS AND SECONDS)                       (XXX.XXHOURS, XXX.XXSEC)
R01781          (FETCHED IN INTERRUPT)
R0179   66  SYSTEM TEST RESULTS                                    (XXXXX., .XXXXX, XXXXX.)
R0181   67  DELTA GYRO ANGLES                                      (XX.XXXDEG  FOR EACH)
R0182   70  PIPA BIAS                                              (X.XXXXCM/SEC SEC  FOR EACH)
R0184   71  PIPA SCALE FACTOR ERROR                                (XXXXX.PARTS/MILLION  FOR EACH)
R0186   72  DELTA POSITION                                         (XXXX.XKILOMETERS  FOR EACH)
R0188   73  DELTA VELOCITY                                         (XXXX.XMETERS/SEC  FOR EACH)
R0190   74  MEASUREMENT DATA (MIDCOURSE)                           (XXX.XXHOURS (INTERNAL UNITS=WEEKS), XXXX.XKILOMETERS, XXXXX.
R0192   75  MEASUREMENT DEVIATIONS (MIDCOURSE)                     (XXXX.XKILOMETERS, XXXX.XMETERS/SEC, XXXX.XKILOMETERS)
R0194   76  POSITION VECTOR                                        (XXXX.XKILOMETERS  FOR EACH)
R0196   77  VELOCITY VECTOR                                        (XXXX.XMETERS/SEC  FOR EACH)
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OCTAL

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       ERASABLE ASSIGNMENTS                                                          USER'S OWN PAGE NO.   1

 0001                                    0000  A         EQUALS 0
 0002                                    0001  L         EQUALS 1                L AND Q ARE BOTH CHANNELS AND REGISTERS.
 0003                                    0002  Q         EQUALS 2
 0004                                    0003  EBANK     EQUALS 3
 0005                                    0004  FBANK     EQUALS 4
 0006                                    0005  Z         EQUALS 5                ADJACENT TO FBANK AND BBANK FOR DXCH Z
 0007                                    0006  BBANK     EQUALS 6                (DTCB) AND DXCH FBANK (DTCF).
A0008                                                                            REGISTER 7 IS A ZERO-SOURCE, USED BY ZL.

 0009                                    0010  ARUPT     EQUALS 10               INTERRUPT STORAGE.
 0010                                    0011  LRUPT     EQUALS 11
 0011                                    0012  QRUPT     EQUALS 12
 0012                                    0015  ZRUPT     EQUALS 15               (13 AND 14 ARE SPARES.)
 0013                                    0016  BANKRUPT  EQUALS 16               USUALLY HOLDS FBANK OR BBANK.
 0014                                    0017  BRUPT     EQUALS 17               RESUME ADDRESS AS WELL.

 0015                                    0020  CYR       EQUALS 20
 0016                                    0021  SR        EQUALS 21
 0017                                    0022  CYL       EQUALS 22
 0018                                    0023  EDOP      EQUALS 23               EDITS INTERPRETIVE OPERATION CODE PAIRS.



 0019                                    0024  TIME2     EQUALS 24
 0020                                    0025  TIME1     EQUALS 25
 0021                                    0026  TIME3     EQUALS 26
 0022                                    0027  TIME4     EQUALS 27
 0023                                    0030  TIME5     EQUALS 30
 0024                                    0031  TIME6     EQUALS 31
 0025                                    0032  CDUX      EQUALS 32
 0026                                    0033  CDUY      EQUALS 33
 0027                                    0034  CDUZ      EQUALS 34
 0028                                    0035  OPTY      EQUALS 35
 0029                                    0036  OPTX      EQUALS 36
 0030                                    0037  PIPAX     EQUALS 37
 0031                                    0040  PIPAY     EQUALS 40
 0032                                    0041  PIPAZ     EQUALS 41
 0033                                    0042  BMAGX     EQUALS 42
 0034                                    0043  BMAGY     EQUALS 43
 0035                                    0044  BMAGZ     EQUALS 44
 0036                                    0045  INLINK    EQUALS 45
 0037                                    0046  RNRAD     EQUALS 46
 0038                                    0047  GYROCTR   EQUALS 47
 0039                                    0050  CDUXCMD   EQUALS 50
 0040                                    0051  CDUYCMD   EQUALS 51
 0041                                    0052  CDUZCMD   EQUALS 52
 0042                                    0053  OPTYCMD   EQUALS 53
 0043                                    0054  OPTXCMD   EQUALS 54
 0044                                    0055  EMSD      EQUALS 55
 0045                                    0056  LEMONM    EQUALS 56
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       ERASABLE ASSIGNMENTS                                               USER'S OWN PAGE NO.   2

 0046                                    0057  OUTLINK  EQUALS 57
 0047                                    0060  ALTM     EQUALS 60

 00472                                   0067           SETLOC 67         DECODED REGISTER FOR NIGHT-WATCHMAN ALM.
 00474                         0067      0067  NEWJOB   ERASE

 0048                                    0042  LVSQUARE EQUALS 34D        SQUARE OF VECTOR INPUT TO ABVAL AND UNIT
 0049                                    0044  LV       EQUALS 36D        LENGTH OF VECTOR INPUT TO UNIT.
 0050                                    0046  X1       EQUALS 38D        INTERPRETIVE SPECIAL REGISTERS RELATIVE
 0051                                    0047  X2       EQUALS 39D        TO THE WORK AREA.
 0052                                    0050  S1       EQUALS 40D
 0053                                    0051  S2       EQUALS 41D
 0054                                    0052  QPRET    EQUALS 42D
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        ERASABLE ASSIGNMENTS                                                              USER'S OWN PAGE NO.   3

P0055   GENERAL ERASABLE ASSIGNMENTS.

R0056           THE FOLLOWING ARE EXECUTIVE TEMPORARIES WHICH MAY BE USED BETWEEN CCS NEWJOB INQUIRIES.

 0058                          0100          SETLOC 100

 0059              0100        0100 INTB15+  ERASE                       REFLECTS 15TH BIT OF INDEXABLE ADDRESSES
 0060                          0100 DSEXIT   =      INTB15+              RETURN FOR DSPIN
 0061                          0100 EXITEM   =      INTB15+              RETURN FOR SCALE FACTOR ROUTINE SELECT
 0062                          0100 BLANKRET =      INTB15+              RETURN FOR 2BLANK

 0063              0101        0101 INTBIT15 ERASE                       SIMILAR TO ABOVE.
 0064                          0101 WRDRET   =      INTBIT15             RETURN FOR 5BLANK
 0065                          0101 WDRET    =      INTBIT15             RETURN FOR DSPWD
 0066                          0101 DECRET   =      INTBIT15             RETURN FOR PUTCOM(DEC LOAD)
 0067                          0101 21/22REG =      INTBIT15             TEMP FOR CHARIN

 0068              0102        0102 ADDRWD   ERASE                       12 BIT INTERPRETIVE OPERAND SUB-ADDRESS.
 0069              0103        0103 POLISH   ERASE                       HOLDS CADR MADE FROM POLISH ADDRESS.
 0070                          0103 UPDATRET =      POLISH               RETURN FOR UPDATNN, UPDATVB
 0071                          0103 CHAR     =      POLISH               TEMP FOR CHARIN
 0072                          0103 ERCNT    =      POLISH               COUNTER FOR ERROR LIGHT RESET
 0073                          0103 DECOUNT  =      POLISH               COUNTER FOR SCALING AND DISPLAY (DEC)

 0074              0104        0104 FIXLOC   ERASE                       WORK AREA ADDRESS.

 0075              0105        0105 OVFIND   ERASE                       SET NON-ZERO ON OVERFLOW.

 0076              0106        0113 VBUF     ERASE  +5                   TEMPORARY STORAGE USED FOR VECTORS.
 0077                          0106 SGNON    =      VBUF                 TEMP FOR +,- ON
 0078                          0106 NOUNTEM  =      VBUF                 COUNTER FOR MIXNOUN FETCH
 0079                          0106 DISTEM   =      VBUF                 COUNTER FOR OCTAL DISPLAY VERBS
 0080                          0106 DECTEM   =      VBUF                 COUNTER FOR FETCH (DEC DISPLAY VERBS)

 0081                          0107 SGNOFF   =      VBUF      +1         TEMP FOR +,- ON
 0082                          0107 NVTEMP   =      VBUF      +1         TEMP FOR NVSUB
 0083                          0107 SFTEMP1  =      VBUF      +1         STORAGE FOR SF CONST HI PART(=SFTEMP2-1)

 0084                          0110 CODE     =      VBUF      +2         FOR DSPIN
 0085                          0110 SFTEMP2  =      VBUF      +2         STORAGE FOR SF CONST LO PART(=SFTEMP1+1)

 0086                          0111 MIXTEMP  =      VBUF      +3         FOR MIXNOUN DATA
 0087                          0111 SIGNRET  =      VBUF      +3         RETURN FOR +,- ON

R0088   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

 0089              0114        0116 BUF      ERASE  +2                   TEMPORARY SCALAR STORAGE.
 0090              0117        0120 BUF2     ERASE  +1
 0091                          0114 INDEXLOC EQUALS BUF                  CONTAINS ADDRESS OF SPECIFIED INDEX.
 0092                          0114 SWWORD   EQUALS BUF                  ADDRESS OF SWITCH WORD.
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       ERASABLE ASSIGNMENTS                                                 USER'S OWN PAGE NO.   4

0093                          0115  SWBIT     EQUALS BUF +1              SWITCH BIT WITHIN SWITCH WORD.
0095                  0121    0121  MPTEMP    ERASE                      TEMPORARY USED IN MULTIPLY AND SHIFT.
0096                  0122    0122  DOTINC    ERASE                      COMPONENT INCREMENT FOR DOT SUBROUTINE.
0097                          0122  DVSIGN    EQUALS DOTINC              DETERMINES SIGN OF DDV RESULT.
0098                          0122  ESCAPE    EQUALS DOTINC              USED IN ARCSIN/ARCCOS.
0099                          0122  ENTRET    =      DOTINC              EXIT FROM ENTER

0100                  0123    0123  DOTRET    ERASE                      RETURN FROM DOT SUBROUTINE.
0101                          0123  DVNORMCT  EQUALS DOTRET              DIVIDEND NORMALIZATION COUNT IN DDV.
0102                          0123  ESCAPE2   EQUALS DOTRET              ALTERNATE ARCSIN/ARCCOS SWITCH.
0103                          0123  WDCNT     =      DOTRET              CHAR COUNTER FOR DSPWD
0104                          0123  INREL     =      DOTRET              INPUT BUFFER SELECTOR ( X,Y,Z, REG )

0105                  0124    0124  MATINC    ERASE                      VECTOR INCREMENT IN MXV AND VXM.
0106                          0124  MAXDVSW   EQUALS MATINC              +0 IF DP QUOTIENT IS NEAR ONE - ELSE -1.
0107                          0124  POLYCNT   EQUALS MATINC              POLYNOMIAL LOOP COUNTER
01071                         0124  DSPMMTEM  =      MATINC              DSPCOUNT SAVE FOR DSPMM
0108                          0124  MIXBR     =      MATINC              INDICATOR FOR MIXED OR NORMAL NOUN

0109                  0125    0125  TEM1      ERASE                      EXEC TEMP
01095                         0125  POLYRET   =      TEM1
0110                          0125  DSREL     =      TEM1                REL ADDRESS FOR DSPIN

0111                  0126    0126  TEM2      ERASE                      EXEC TEMP
0112                          0126  DSMAG     =      TEM2                MAGNITUDE STORE FOR DSPIN
0113                          0126  IDADDTEM  =      TEM2                MIXNOUN INDIRECT ADDRESS STORAGE

0114                  0127    0127  TEM3      ERASE                      EXEC TEMP
0115                          0127  COUNT     =      TEM3                FOR DSPIN

0116                  0130    0130  TEM4      ERASE                      EXEC TEMP
0117                          0130  LSTPTR    =      TEM4                LIST POINTER FOR GRABUSY
0118                          0130  RELRET    =      TEM4                RETURN FOR RELDSP
0119                          0130  FREERET   =      TEM4                RETURN FOR FREEDSP

0120                  0131    0131  TEM5      ERASE                      EXEC TEMP
0121                          0131  NOUNADD   =      TEM5                TEMP STORAGE FOR NOUN ADDRESS

0122                  0132    0132  NNADTEM   ERASE                      TEMP FOR NOUN ADDRESS TABLE ENTRY
0123                  0133    0133  NNTYPTEM  ERASE                      TEMP FOR NOUN TYPE TABLE ENTRY
0124                  0134    0134  IDAD1TEM  ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0125                                                                    MUST = IDAD2TEM-1, = IDAD3TEM-2.
0126                  0135    0135  IDAD2TEM  ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0127                                                                    MUST = IDAD1TEM+1, = IDAD3TEM-1.
0128                  0136    0136  IDAD3TEM  ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0129                                                                    MUST = IDAD1TEM+2, = IDAD2TEM+1.
0130                  0137    0137  RUTMXTEM  ERASE                      TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)

R0131         STORAGE USED BY THE EXECUTIVE.
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 0133                      0140      0146  MPAC     ERASE  +6               MULTI-PURPOSE ACCUMULATOR.
 0134                      0147      0147  MODE     ERASE                   +1 FOR TP, +0 FOR DP, OR -1 FOR VECTOR.
 0135                      0150      0150  LOC      ERASE                   LOCATION ASSOCIATED WITH JOB.
 0136                      0151      0151  BANKSET  ERASE                   USUALLY CONTAINS BBANK SETTING.
 0137                      0152      0152  PUSHLOC  ERASE                   WORD OF PACKED INTERPRETIVE PARAMETERS.
 0138                      0153      0153  PRIORITY ERASE                   PRIORITY OF PRESENT JOB AND WORK AREA.

 0139                      0154      0263           ERASE  +71D             SEVEN SETS OF 12 REGISTERS EACH.

 0140                      0264      0264  VAC1USE  ERASE
 0141                      0265      0337  VAC1     ERASE  +42D
 0142                      0340      0340  VAC2USE  ERASE
 0143                      0341      0413  VAC2     ERASE  +42D
 0144                      0414      0414  VAC3USE  ERASE
 0145                      0415      0467  VAC3     ERASE  +42D
 0146                      0470      0470  VAC4USE  ERASE
 0147                      0471      0543  VAC4     ERASE  +42D
 0148                      0544      0544  VAC5USE  ERASE
 0149                      0545      0617  VAC5     ERASE  +42D

R0150         INTERPRETIVE SWITCH RESERVATIONS.

 0151                      0620      0623  STATE    ERASE  +3               60 SWITCHES PRESENTLY.

R0152         THE FOLLOWING SET COMPRISES THE INTERRUPT TEMPORARY STORAGE POOL.

 0154                      0624      0624  WAITEXIT ERASE
 0155                                0624  KEYTEMP1 =      WAITEXIT         TEMP FOR KEYRUPT, UPRUPT
 0156                                0624  DSRUPTEM =      WAITEXIT         TEMP FOR DSPOUT

 0157                      0625      0625  WAITBANK ERASE
 0158                      0626      0626  EXECTEM1 ERASE
 0159                      0627      0627  EXECTEM2 ERASE
 0160                      0630      0630  WAITADR  ERASE
 0161                      0631      0631  WAITTEMP ERASE

 0162                      0632      0632  NEWPRIO  ERASE                   EXECUTIVE RESERVATIONS (TEMP ONLY).
 0163                      0633      0634  NEWLOC   ERASE  +1
 0164                      0635      0635  LOCCTR   ERASE

R0165         WAITLIST REPEAT FLAG:

 0166                      0636      0636  RUPTAGN  ERASE
 0167                                0636  KEYTEMP2 =      RUPTAGN          TEMP FOR KEYRUPT, UPRUPT
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P0168   THE FOLLOWING REGISTERS ARE RESERVED FOR PINBALL


R0169   RESERVED FOR PINBALL EXECUTIVE ACTION

 0170                        0637       0637  DSPCOUNT ERASE                    DISPLAY POSITION INDICATOR
 0171                        0640       0640  DECBRNCH ERASE                    +DEC, - DEC, OCT INDICATOR
 0172                        0641       0641  VERBREG  ERASE                    VERB CODE
 0173                        0642       0642  NOUNREG  ERASE                    NOUN CODE
 0174                        0643       0643  XREG     ERASE                    R1 INPUT BUFFER
 0175                        0644       0644  YREG     ERASE                    R2 INPUT BUFFER
 0176                        0645       0645  ZREG     ERASE                    R3 INPUT BUFFER
 0177                        0646       0646  XREGLP   ERASE                    LO PART OF XREG (FOR DEC CONV ONLY)
 0178                        0647       0647  YREGLP   ERASE                    LO PART OF YREG (FOR DEC CONV ONLY)
 0179                        0650       0650  ZREGLP   ERASE                    LO PART OF ZREG (FOR DEC CONV ONLY)
 0180                        0651       0651  MODREG   ERASE                    MODE CODE
 0181                        0652       0652  DSPLOCK  ERASE                    KEYBOARD/SUBROUTINE CALL INTERLOCK
 0182                        0653       0653  REQRET   ERASE                    RETURN REGISTER FOR LOAD
 0183                        0654       0654  LOADSTAT ERASE                    STATUS INDICATOR FOR LOADTST
 0184                        0655       0655  CLPASS   ERASE                    PASS INDICATOR CLEAR
 0185                        0656       0656  NOUT     ERASE                    ACTIVITY COUNTER FOR DSPTAB
 0186                        0657       0657  NOUNCADR ERASE                    MACHINE CADR FOR NOUN
 0187                        0660       0660  MONSAVE  ERASE                    N/V CODE FOR MONITOR. (= MONSAVE1-1)
 0188                        0661       0661  MONSAVE1 ERASE                    NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
 0189                        0662       0675  DSPTAB   ERASE  +11D              0-10D, DISPLAY PANEL BUFF. 11D, C/S LTS.
 0190                        0676       0676  CADRSTOR ERASE                    ENDIDLE STORAGE
 0191                        0677       0677  GRABLOCK ERASE                    INTERNAL INTERLOCK FOR DISPLAY SYSTEM
 0192                        0700       0700  NVQTEM   ERASE                    NVSUB STORAGE FOR CALLING ADDRESS
A0193                                                                           MUST = NVBNKTEM-1
 0194                        0701       0701  NVBNKTEM ERASE                    NVSUB STORAGE FOR CALLING BANK
A0195                                                                           MUST = NVQTEM+1
 0196                        0702       0704  DSPLIST  ERASE           +2       WAITING LIST FOR DSP SYST INTERNAL USE
 0197                        0705       0705  EXTVBACT ERASE                    EXTENDED VERB ACTIVITY INTERLOCK
 0198                        0706       0710  DSPTEM1  ERASE           +2       BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
 0199                        0711       0713  DSPTEM2  ERASE           +2       BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
R0200   END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION


R0201   RESERVED FOR PINBALL INTERRUPT ACTION

 0202                        0714       0714  DSPCNT   ERASE                    COUNTER FOR DSPOUT
 0203                        0715       0715  UPLOCK   ERASE                    BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0204                                                                           RECEPTION OF A BAD MESSAGE IN UPLINK)
R0205   END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION
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P0206   TEMPORARY PHONY ASSIGNMENTS TO KEEP PINBALL FROM HAVING BAD ASSEMBLIES

 0207                           0716      0720  THETAD   ERASE   +2
 0209                           0721      0721  FAILREG  ERASE
 0210                           0722      0723  TDEC     ERASE   +1
 0211                           0724      0725  TET      ERASE   +1
 0212                           0726      0727  MEASQ    ERASE   +1
 0213                           0730      0732  ROLL     ERASE   +2
 0214                           0733      0740  LANDMARK ERASE   +5
 0215                           0741      0743  GBIASX   ERASE   +2
 0216                           0744      0746  ADIAX    ERASE   +2
 0217                           0747      0751  ADSRAX   ERASE   +2
 0218                           0752      0753  DESOPTX  ERASE   +1
 0219                           0754      0755  SAMPTIME ERASE   +1
 0220                           0756      0763  DELVX    ERASE   +5
 0221                           0764      0764  PBIASX   ERASE
 02211                          0765      0765  PIPASCFX ERASE
 0222                           0766      0766  PBIASY   ERASE
 02221                          0767      0767  PIPASCFY ERASE
 0223                           0770      0770  PBIASZ   ERASE
 02231                          0771      0771  PIPASCFZ ERASE
 0226                                     1000           SETLOC  1000
 0227                           1000      1005  DELR     ERASE   +5
 0228                           1006      1013  DELVEL   ERASE   +5
 0229                           1014      1014  MEASMODE ERASE
 0230                           1015      1016  DELTAQ   ERASE   +1
 02301                          1017      1017  WASKSET  ERASE
R0231   END OF PHONY ASSIGNMENTS
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R0232   ASSIGNMENTS FOR T4RUPT PROGRAM

 0233                         1020        1020  DSRUPTSW ERASE
 0234                         1021        1021  OLDERR   ERASE
 0235                         1022        1022  WASOPSET ERASE
R0236   END OF T4RUPT ASSIGNMENTS


R0237   ASSIGNMENTS FOR DOWNRUPT

 0238                         1023        1023  DISPBUF  ERASE
 0239                         1024        1024  TMKEYBUF ERASE
R0240   END OF DOWNRUPT ASSIGNMENTS


R0241   ASSIGNMENTS FOR SELF CHECK

R0242   ADDRESSES TO BE USED FOR INDEX INSTRUCTION WITHOUT EXTRACODES
 02421                        1025        1025  NDX+0    ERASE
 024211                       1026        1026  NDX+MAX  ERASE
 024212                       1027        1027  NDXKEEP1 ERASE
 024213                       1030        1030  NDXKEEP2 ERASE
 024214                       1031        1031  NDXKEEP3 ERASE
 024215                       1032        1032  NDXSELF1 ERASE
 024216                       1033        1033  NDXSELF2 ERASE

 02422                        1034        1034  KEEP1    ERASE
 024221                       1035        1035  KEEP2    ERASE
 024222                       1036        1036  KEEP3    ERASE
 024223                       1037        1037  KEEP4    ERASE
 024224                       1040        1040  KEEP5    ERASE
 024225                       1041        1041  KEEP6    ERASE
 024226                       1042        1042  KEEP7    ERASE

 02423                        1043        1043  SELFRET  ERASE
 024231                       1044        1044  SFAIL    ERASE
 024232                       1045        1045  ERCOUNT  ERASE
 024233                       1046        1046  SCOUNT   ERASE
 024234                       1047        1047  SMODE    ERASE

R0243   END OF SELF CHECK ASSIGNMENTS


R0244             WAITLIST TASK LISTS:

 0245                              E3,1400           SETLOC 1400
```

```
0246                    E3,1400   E3,1404  LST1      ERASE   +4               DELTA TS.
0247                    E3,1405   E3,1420  LST2      ERASE   +11D             2CADR TASK ADDRESSES.
```

```
        INPUT/OUTPUT CHANNELS                                                         USER'S OWN PAGE NO.   1

 0001                                              0010  OUT0      EQUALS 10
 0002                                              0011  DSALMOUT  EQUALS 11
 00021                                             0013  CHAN13    EQUALS 13
 0003                                              0015  MNKEYIN   EQUALS 15
 0004                                              0016  NAVKEYIN  EQUALS 16
R0005   END OF CHANNEL ASSIGNMENTS
```

```
INS   INTERRUPT LEAD INS                                                USER'S OWN PAGE NO.   1

0001                         4000         SETLOC 4000

0002                 4000  0 0004 0       INHINT                   GO
0003                 4001  3 4054 1       CAF     GOBB
0004                 4002  56 006 1       XCH     BBANK
0005                 4003  1 2721 0       TCF     GOPROG

0006                 4004  52 011 0       DXCH    ARUPT            T6RUPT
0007                 4005  3 4055 0       CAF     T6RPTBB
0008                 4006  56 006 1       XCH     BBANK
0009                 4007  1 4330 1       TCF     RESUME    +3     ***FIX LATER***

0010                 4010  52 011 0       DXCH    ARUPT            T5RUPT
0011                 4011  3 4056 0       CAF     T5RPTBB
0012                 4012  56 006 1       XCH     BBANK
0013                 4013  1 4330 1       TCF     RESUME    +3     ***FIX LATER***

0014                 4014  52 011 0       DXCH    ARUPT            T3RUPT
0015                 4015  3 4057 1       CAF     T3RPTBB
0016                 4016  56 006 1       XCH     BBANK
0017                 4017  1 4272 0       TCF     T3RUPT

0018                 4020  52 011 0       DXCH    ARUPT            T4RUPT
0019                 4021  3 4060 0       CAF     T4RPTBB
0020                 4022  56 006 1       XCH     BBANK
0021                 4023  1 3052 1       TCF     T4RUPT

0022                 4024  52 011 0       DXCH    ARUPT            KEYRUPT1
0023                 4025  3 4061 1       CAF     KEYRPTBB
0024                 4026  56 006 1       XCH     BBANK
0025                 4027  1 3153 1       TCF     KEYRUPT1

0026                 4030  52 011 0       DXCH    ARUPT            KEYRUPT2
0027                 4031  3 4061 1       CAF     KEYRPTBB
0028                 4032  56 006 1       XCH     BBANK
0029                 4033  1 3175 0       TCF     KEYRUPT2

0030                 4034  52 011 0       DXCH    ARUPT            UPRUPT
0031                 4035  3 4061 1       CAF     UPRPTBB
0032                 4036  56 006 1       XCH     BBANK
0033                 4037  1 3205 1       TCF     UPRUPT

0034                 4040  52 011 0       DXCH    ARUPT            DOWNRUPT
0035                 4041  3 4062 1       CAF     DWNRPTBB
0036                 4042  56 006 1       XCH     BBANK
0037                 4043  1 4330 1       TCF     RESUME    +3     ***FIX LATER***

0038                 4044  50 017 1       RESUME                   RADAR RUPT    ****FIX LATER******

0039                         4050         SETLOC 4050
```

```
INS    INTERRUPT LEAD INS                                                     USER'S OWN PAGE NO.   2
0040                           4050  50 017 1         RESUME                 HAND CONTROL RUPT   ***FIX LATER****


0041                                     4054         SETLOC 4054

0042                                       E3         EBANK= LST1            RESTART USES E0, E3
0043                           4054   02003 0  GOBB       BBCON  GOPROG

0044                                       E0         EBANK= TIME1
0045                           4055   04000 0  T6RPTBB    BBCON  RESUME          ***FIX LATER***

0046                                       E0         EBANK= TIME1
0047                           4056   04000 0  T5RPTBB    BBCON  RESUME          ***FIX LATER***

0048                                       E3         EBANK= LST1
0049                           4057   04003 0  T3RPTBB    BBCON  T3RUPT

0050                                       E2         EBANK= DSRUPTSW
0051                           4060   02002 1  T4RPTBB    BBCON  T4RUPT

0052                                       E1         EBANK= KEYTEMP1
0053                           4061   02001 1  KEYRPTBB   BBCON  KEYRUPT1

0054                                     4061  UPRPTBB    =      KEYRPTBB

0055                                       E0         EBANK= TIME1
0056                           4062   04000 0  DWNRPTBB   BBCON  RESUME          ***FIX LATER ***

0057                                     4063  ENDINTFF   EQUALS
```

```
R0001    SECTION 1  DISPATCHER

R0002              ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST  INSTRUCTION, BANKSET TO THE FBANK OF THE
R0004    OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN
R0006    VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS
R0008    (BIT15 OF FBANK = 1) DO NOT REFER TO LOWBANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPER-BANK,
R0010    NOR DOES IT SWITCH EBANKS. MOST EBANK SWITCHING IS DONE BY THE EXECUTIVE PROGRAM.


 0012                          6000                SETLOC 6000

 0013                    6000  0 0006 1  INTPRET   EXTEND                  SET LOC TO THE WORD FOLLOWING THE TC.
 0014                    6001  22 150 0            QXCH    LOC

 0015                    6002  3 0004 0   +2       CA      FBANK           INTERPRETIVE BRANCHES FINISH HERE.
 0016                    6003  54 151 0            TS      BANKSET
 0017                    6004  7 7630 1            MASK    BIT15           GET 15TH BIT FOR INDEXABLE ADDRESSES.
 0018                    6005  54 101 0            TS      INTBIT15
 0019                    6006  6 6425 1            AD      LOW10           THIS VERSION IS USED IN PROCESSING
 0020                    6007  54 100 1            TS      INTB15+         INDEXABLE FIXED-BANK ADDRESSES.

 0021                    6010  1 6023 1            TCF     NEWOPS          PICK UP OP CODE PAIR AND BEGIN.


 0022                    6011  22 006 1  INTRSM    LXCH    BBANK           RESUME SUSPENDED INTERPRETIVE JOB
 0023                    6012  1 6017 0            TCF     DANZIG +3       (ACTUALLY PART OF THE EXECUTIVE).
```

```
P0024          AT THE END OF MOST INSTRUCTIONS, CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

 0026                     6013  54 147 1  NEWMODE   TS      MODE              PROLOGUE FOR MODE-CHANGING INSTRUCTIONS.

 0027                     6014  3 0151 1  DANZIG    CA      BANKSET           SET FBANK BEFORE TESTING NEWJOB SO THAT
 0028                     6015  54 004 1            TS      FBANK             BBANK MAY BE SAVED DIRECTLY BY CHANJOB.

 0029                     6016  10 023 1            CCS     EDOP              SEE IF AN ORDER CODE IS LEFT OVER FROM
 0030                     6017  1 6032 1            TCF     OPJUMP            THE LAST PAIR RETRIEVED. IF SO, EXECUTE.
A0031                                                                         EDOP IS SET TO ZERO ON ITS RE-EDITING.

 0032                     6020  10 067 1            CCS     NEWJOB            SEE IF A JOB OF HIGHER PRIORITY IS
 0033                     6021  1 4160 0            TCF     CHANG2            PRESENT, AND IF SO, CHANGE JOBS.

 0034                     6022  24 150 0            INCR    LOC               ADVANCE THE LOCATION COUNTER.
 0035                     6023  50 150 0  NEWOPS    INDEX   LOC               ENTRY TO BEGIN BY PICKING OP CODE PAIR.
 0036                     6024  3 0000 1            CA      0                 MAY BE AN OPCODE PAIR OR A STORE CODE.
 0037                     6025  10 000 0            CCS     A                 TEST SIGN AND GET DABS(A).
 0038                     6026  1 6341 0            TCF     DOSTORE           PROCESS STORE CODE.

 0039                     6027   00177 0  LOW7      OCT     177

 0040                     6030  54 023 1            TS      EDOP              OP CODE PAIR. LEAVE THE OTHER IN EDOP
 0041                     6031  7 6027 0            MASK    LOW7              WHERE  CCS EDOP  WILL HONOR IT NEXT.

 0042                     6032  54 020 1  OPJUMP    TS      CYR               LOWWD ENTERS HERE IF A RIGHT-HAND OP
 0043                     6033  10 020 1            CCS     CYR               CODE IS TO BE PROCESSED. TEST PREFICES.
 0044                     6034  1 6167 0            TCF     OPJUMP2           TEST SECOND PREFIX BIT.

 0045                     6035  1 6730 1            TCF     EXIT              +0 OP CODE IS EXIT.
```

```
P0046           PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

 0048                     6036  7 7646 0  ADDRESS  MASK    BIT1             SEE IF ADDRESS IS INDEXED. CYR CONTAINED
 0049                     6037 10 000 0            CCS     A                400XX, SO BIT 1 IS NOW AS IT WAS IN CYR.
 0050                     6040  1 6073 1           TCF     INDEX            FORM INDEXED ADDRESS.

 0051                     6041 50 150 0  DIRADRES INDEX   LOC              LOOK AHEAD TO NEXT WORD TO SEE IF
 0052                     6042  4 0001 1  OCT40001 CS      1                ADDRESS IS GIVEN.
 0053                     6043 10 000 0            CCS     A
 0054                     6044  1 6135 1           TCF     PUSHUP           IF NOT.

 0055                     6045   77773 1  NEG4     DEC     -4

 0056                     6046 24 150 0            INCR    LOC              IF SO, TO SHOW WE PICKED UP A WORD.
 0057                     6047 54 102 0            TS      ADDRWD
```

```
P0058           FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE
R0060     REQUIRED 12 BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED BANK SWITCHING DONE (F ONLY). ADDRESSES LESS
R0062     THAN 45D ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.


 0064                          6050  6 6171 0            AD      -ENDVAC          SEE IF ADDRESS RELATIVE TO WORK AREA.
 0065                          6051  10 000 0            CCS     A
 0066                          6052  6 6234 1            AD      -ENDERAS         IF NOT, SEE IF IN GENERAL ERASABLE.
 0067                          6053  1 6060 0            TCF     IERASTST

 0068                          6054  3 0104 1  NETZERO   CA      FIXLOC           IF SO, LEAVE THE MODIFIED ADDRESS IN
 0069                          6055  26 102 0            ADS     ADDRWD           ADDRWD AND DISPATCH.
 0070                          6056  50 020 0   +2       INDEX   CYR              THIS INDEX MAKES THE NEXT INSTRUCTION
 0071                          6057  7 6234 0            7       INDJUMP -1       TCF INDJUMP + OP, EDITING CYR.

 0072                          6060  0 0006 1  IERASTST  EXTEND
 0073                          6061  6 6056 1            BZMF    NETZERO +2       GENERAL ERASABLE - DISPATCH IMMEDIATELY.

 0074                          6062  6 0100 0  FIXEDADR  AD      INTB15+          FIXED BANK ADDRESS. RESTORE AND ADD B15.
 0075                          6063  54 004 1   +1       TS      FBANK            SWITCH BANKS AND LEAVE SUB-ADDRESS IN
 0076                          6064  7 6425 0            MASK    LOW10            ADDRWD FOR OPERAND RETRIEVAL.
 0077                          6065  6 7634 1            AD      2K
 0078                          6066  54 102 0            TS      ADDRWD
 0079                          6067  50 020 0            INDEX   CYR
 0080                          6070  7 6234 0            7       INDJUMP -1
```

```
        LIST-PROCESSING INTERPRETER                                                      USER'S OWN PAGE NO.   5

P0081             THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY
R0083   CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM
R0085   BANK, OR ANY INTEGER IN THAT RANGE.

 0086                          6071  3 7661 1  DODLOAD* CAF     DLOAD*           STODL* COMES HERE TO PROCESS LOAD ADR.
 0087                          6072  54 020 1           TS      CYR              (STOVL* ENTERS HERE).

 0088                          6073  3 0104 1  INDEX    CA      FIXLOC           SET UP INDEX LOCATION.
 0089                          6074  54 114 1           TS      INDEXLOC
 0090                          6075  24 150 0           INCR    LOC              (ADDRESS ALWAYS GIVEN).
 0091                          6076  50 150 0           INDEX   LOC
 0092                          6077  4 0000 0           CS      0
 0093                          6100  10 000 0           CCS     A                INDEX 2 IF ADDRESS STORED COMPLEMENTED.
 0094                          6101  24 114 0           INCR    INDEXLOC
 0095                          6102  1 6103 1           NOOP

 0096                          6103  54 102 0           TS      ADDRWD           14 BIT ADDRESS TO ADDRWD.
 0097                          6104  7 6232 0           MASK    BANKMASK         IF ADDRESS GREATER THAN 1K, ADD INTBIT15
 0098                          6105  0 0006 1           EXTEND
 0099                          6106  1 6111 1           BZF     INDEX2
 0100                          6107  3 0101 1           CA      INTBIT15
 0101                          6110  26 102 0           ADS     ADDRWD

 0102                          6111  50 114 0  INDEX2   INDEX   INDEXLOC
 0103                          6112  4 0046 1           CS      X1
 0104                          6113  26 102 0           ADS     ADDRWD           DO AUGMENT, IGNORING AND CORRECTING OVF.

 0105                          6114  7 6231 0           MASK    HIGH9            SEE IF ADDRESS IS IN WORK AREA.
 0106                          6115  0 0006 1           EXTEND
 0107                          6116  1 6131 0           BZF     INDWORK
 0108                          6117  7 6232 0           MASK    BANKMASK         SEE IF IN FIXED BANK.
 0109                          6120  0 0006 1           EXTEND
 0110                          6121  1 6133 1           BZF     INDERASE

 0111                          6122  3 0102 1           CA      ADDRWD           IN FIXED - SWITCH BANKS AND CREATE
 0112                          6123  54 004 1           TS      FBANK            SUB-ADDRESS.
 0113                          6124  7 6425 0           MASK    LOW10
 0114                          6125  6 7634 1           AD      2K
 0115                          6126  54 102 0           TS      ADDRWD
 0116                          6127  50 020 0           INDEX   CYR
 0117                          6130  3 6234 1           3       INDJUMP -1

 0118                          6131  3 0104 1  INDWORK  CA      FIXLOC           MAKE ADDRWD RELATIVE TO WORK AREA.
 0119                          6132  26 102 0           ADS     ADDRWD

 0120                          6133  50 020 0  INDERASE INDEX   CYR
 0121                          6134  3 6234 1           3       INDJUMP -1
```

```
P0122           PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN
R0124   LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED
R0126   IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED
R0128   BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT):

R0129           1.  VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR
R0131   RESULT, VXSC WANTS A SCALAR.

R0132           2.  THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS
R0134   INCLUDES VLOAD, DLOAD, TLOAD, PDDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0135           3.  SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION.
R0137   THIS INCLUDES SIGN WANTING DP AND TAD REQUIRING TP.

 0138                     6135   3 6227 0  PUSHUP     CAF      OCT23             IF THE LOW 5 BITS OF CYR ARE LESS THAN
 0139                     6136   7 0020 1             MASK     CYR               20, THIS OP REQUIRES SPECIAL ATTENTION.
 0140                     6137   6 6142 0             AD       -OCT10            (NO -0).
 0141                     6140  10 000 0              CCS      A
 0142                     6141   1 6153 1             TCF      REGUP             FOR ALL CODES GREATER THAN OCT 7.

 0143                     6142    77767 1  -OCT10     OCT      -10

 0144                     6143   6 6045 0             AD       NEG4              WE NOW HAVE 7 - DP CODE(MOD4). SEE IF
 0145                     6144  10 000 0              CCS      A                 THE DP CODE (MOD4) IS THREE (REVERSE).
 0146                     6145  50 000 1              INDEX    A                 NO - THE MODE IS DEFINITE. PICK UP THE
 0147                     6146   4 6164 0             CS       NO.WDS
 0148                     6147   1 6155 1             TCF      REGUP +2

 0149                     6150  50 147 0              INDEX    MODE              FOR VXSC AND V/SC WE WANT THE REQUIRED
 0150                     6151   4 6162 0             CS       REVCNT            PUSHLOC DECREMENT WITHOUT CHANGING THE
 0151                     6152   1 6155 1             TCF      REGUP +2          MODE AT THIS TIME.

 0152                     6153  50 147 0   REGUP      INDEX    MODE              MOST ALL DP CODES PUSHUP HERE.
 0153                     6154   4 6164 0             CS       NO.WDS
 0154                     6155  26 152 0    +2        ADS      PUSHLOC
 0155                     6156  54 102 0              TS       ADDRWD
 0156                     6157  50 020 0              INDEX    CYR
 0157                     6160   7 6234 0             7        INDJUMP -1        (THE INDEX MAKES THIS A TCF.)

 0158                     6161    00002 0             OCT      2                 REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
 0159                     6162    00006 1  REVCNT     OCT      6                 WORDS, SCALAR TAKES 6.
 0160                     6163    00006 1             OCT      6
 0161                     6164    00002 0  NO.WDS     OCT      2                 CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
 0162                     6165    00003 1             OCT      3                 2 IN DP, AND 3 IN TP.
 0163                     6166    00006 1             OCT      6
```

```
P0164          TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

 0166                     6167  10 020 1  OPJUMP2  CCS    CYR            TEST SECOND PREFIX BIT.
 0167                     6170  1 6217 1           TCF    OPJUMP3        TEST THIRD BIT TO SEE IF UNARY OR SHIFT.

 0168                     6171   77722 0  -ENDVAC  DEC    -45

R0169          THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUFFIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES
R0171     IN THE RANGE 0 - 52, ERASABLE ADRES CONSTANTS FROM 100 - 1777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE
R0173     IN CONTRAST TO SUFFIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

 0174                     6172  24 150 0  15BITADR INCR   LOC            (ENTRY HERE FROM STCALL).
 0175                     6173  50 150 0           INDEX  LOC            PICK UP ADDRESS WORD.
 0176                     6174  3 0000 1           CA     0
 0177                     6175  54 103 1           TS     POLISH         THE ABSOLUTE ADDRESS WILL BE LEFT IN
 0178                     6176  54 102 0           TS     ADDRWD         POLISH WITH AN ERASABLE SUBADDRESS IN
A0179                                                                    ADDRWD.
 0180                     6177  7 6231 0           MASK   HIGH9          SEE IF RELATIVE TO THE WORK AREA.
 0181                     6200  10 000 0           CCS    A
 0182                     6201  1 6203 1           TCF    +2
 0183                     6202  1 6210 0           TCF    RELWORK        ONLY IF ZERO.

 0184                     6203  3 6230 0           CAF    LOW7+2K        THESE INSTRUCTIONS ARE IN BANK 1.
 0185                     6204  54 004 1           TS     FBANK
 0186                     6205  7 0020 1           MASK   CYR
 0187                     6206  50 000 1           INDEX  A
 0188                     6207  1 6275 0           TCF    MISCJUMP

 0189                     6210  3 0104 1  RELWORK  CA     FIXLOC         MAKE ADDRWD RELATIVE TO FIXLOC, LEAVING
 0190                     6211  26 102 0           ADS    ADDRWD         POLISH ABSOLUTE IN CASE THIS WAS AN
 0191                     6212  3 6230 0           CAF    LOW7+2K        AXT, ETC.
 0192                     6213  54 004 1           TS     FBANK
 0193                     6214  7 0020 1           MASK   CYR
 0194                     6215  50 000 1           INDEX  A
 0195                     6216  1 6275 0           TCF    MISCJUMP
```

```
P0196           COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

 0197                     6217  54 004 1  OPJUMP3  TS      FBANK       CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
 0198                     6220  10 020 1           CCS     CYR         TEST THIRD PREFIX BIT.
 0199                     6221  50 000 1           INDEX   A           THE DECREMENTED UNARY CODE IS IN BITS
 0200                     6222  1 6315 1           TCF     UNAJUMP     1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)

 0201                     6223  10 147 1           CCS     MODE        ITS A SHORT SHIFT CODE. SEE IF PRESENT
 0202                     6224  1 2000 1           TCF     SHORTT      SCALAR OR VECTOR.
 0203                     6225  1 2000 1           TCF     SHORTT
 0204                     6226  1 2102 1           TCF     SHORTV      CALLS THE APPROPRIATE ROUTINE.


 0205                     6227   00023 0  OCT23    OCT     23          MASK USED BY PUSH-UP ROUTINE.
 0206                     6230   02177 1  LOW7+2K  OCT     2177        OP CODE MASK + BANK 1 FBANK SETTING.
 0207                     6231   77700 0  HIGH9    OCT     77700
 0208                     6232   76000 0  BANKMASK OCT     76000       FBANK MASK.
 0209                             6232  FBANKMSK EQUALS  BANKMASK
 0210                     6233   36000 1  B11T14   OCT     36000       USED IN PROCESSING STORE CODES.
 0211                     6234   76056 0  -ENDERAS DEC     -977
```

```
P0212          THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

 0214                        6235  1 6510 1  INDJUMP  TCF      VLOAD            00 - LOAD MPAC WITH A VECTOR.
 0215                        6236  1 7047 1           TCF      TAD              01 - TRIPLE PRECISION ADD TO MPAC.
 0216                        6237  1 7572 1           TCF      SIGN             02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
 0217                        6240  1 7345 0           TCF      VXSC             03 - VECTOR TIMES SCALAR.
 0218                        6241  1 6671 0           TCF      CGOTO            04 - COMPUTED GO TO.
 0219                        6242  1 6473 0           TCF      TLOAD            05 - LOAD MPAC WITH TRIPLE PRECISION.
 0220                        6243  1 6464 0           TCF      DLOAD            06 - LOAD MPAC WITH A DP SCALAR.
 0221                        6244  1 7541 1           TCF      V/SC             07 - VECTOR DIVIDED BY SCALAR.

 0222                        6245  1 6504 1           TCF      SLOAD            10 - LOAD MPAC IN SINGLE PRECISION.
 0223                        6246  1 6623 1           TCF      SSP              11 - SET SINGLE PRECISION INTO X.
 0224                        6247  1 6526 1           TCF      PDDL             12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
 0225                        6250  1 7300 1           TCF      MXV              13 - MATRIX POST-MULTIPLIED BY VECTOR.
 0226                        6251  1 6562 1           TCF      PDVL             14 - PUSH DOWN AND VECTOR LOAD.
 0227                        6252  1 6631 1           TCF      CCALL            15 - COMPUTED CALL.
 0228                        6253  1 7303 1           TCF      VXM              16 - MATRIX PRE-MULTIPLIED BY VECTOR.
 0229                        6254  1 7533 1           TCF      TSLC             17 - NORMALIZE MPAC (SCALAR ONLY).

 0230                        6255  1 7511 1           TCF      DMPR             20 - DP MULTIPLY AND ROUND.
 0231                        6256  1 7514 1           TCF      DDV              21 - DP DIVIDE BY.
 0232                        6257  1 7520 0           TCF      BDDV             22 - DP DIVIDE INTO.
 0233                        6260  1 7536 1           TCF      GSHIFT           23 - GENERAL SHIFT INSTRUCTION.
 0234                        6261  1 6732 0           TCF      VAD              24 - VECTOR ADD.
 0235                        6262  1 6760 1           TCF      VSU              25 - VECTOR SUBTRACT.
 0236                        6263  1 7010 0           TCF      BVSU             26 - VECTOR SUBTRACT FROM.
 0237                        6264  1 7275 1           TCF      DOT              27 - VECTOR DOT PRODUCT.

 0238                        6265  1 7423 1           TCF      VXV              30 - VECTOR CROSS PRODUCT.
 0239                        6266  1 7371 1           TCF      VPROJ            31 - VECTOR PROJECTION.
 0240                        6267  1 6776 0           TCF      DSU              32 - DP SUBTRACT.
 0241                        6270  1 7034 0           TCF      BDSU             33 - DP SUBTRACT FROM.
 0242                        6271  1 6750 1           TCF      DAD              34 - DP ADD.
 0243                        6272  1 6272 1           TCF                       35 - AVAILABLE
 0244                        6273  1 7507 0           TCF      DMP1             36 - DP MULTIPLY.
 0245                        6274  1 7530 1           TCF      SETPD            37 - SET PUSH DOWN POINTER (DIRECT ONLY).

R0246    CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.
```

```
P0248           THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

 0250                      6275  1 2000 1  MISCJUMP TCF     AXT              00 - ADDRESS TO INDEX TRUE.
 0251                      6276  1 2005 1           TCF     AXC              01 - ADDRESS TO INDEX COMPLEMENTED.
 0252                      6277  1 2010 0           TCF     LXA              02 - LOAD INDEX FROM ERASABLE.
 0253                      6300  1 2014 1           TCF     LXC              03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
 0254                      6301  1 2020 0           TCF     SXA              04 - STORE INDEX IN ERASABLE.
 0255                      6302  1 2024 1           TCF     XCHX             05 - EXCHANGE INDEX WITH ERASABLE.
 0256                      6303  1 2040 0           TCF     INCR             06 - INCREMENT INDEX REGISTER.
 0257                      6304  1 2047 1           TCF     TIX              07 - TRANSFER ON INDEX.

 0258                      6305  1 2032 0           TCF     XAD              10 - INDEX REGISTER ADD FROM ERASABLE.
 0259                      6306  1 2043 0           TCF     XSU              11 - INDEX SUBTRACT FROM ERASABLE.
 0260                      6307  1 2107 1           TCF     BZE/GOTO         12 - BRANCH ZERO AND GOTO.
 0261                      6310  1 2114 0           TCF     BPL/BMN          13 - BRANCH PLUS AND BRANCH MINUS.
 0262                      6311  1 2127 0           TCF     CALL/ITA         14 - CALL AND STORE QPRET.
 0263                      6312  1 2067 0           TCF     RTB/BHIZ         15 - RETURN TO BASIC AND BRANCH HI ZERO.
 0264                      6313  1 2135 0           TCF     SW/              16 - SWITCH INSTRUCTIONS AND AVAILABLE.
 0265                      6314  1 2077 1           TCF     BOV(B)           17 - BRANCH ON OVERFLOW TO BASIC OR INT.
```

```
P0266          THE FOLLOWING JUMP TABLE APPIES TO UNARY INSTRUCTIONS.

A0267                                                                     00 - EXIT - DETECTED EARLIER.
 0268                  6315  1 3125 0  UNAJUMP   TCF      SQRT            01 - SQUARE ROOT.
 0269                  6316  1 3442 1            TCF      SINE            02 - SIN.
 0270                  6317  1 3431 0            TCF      COSINE          03 - COS.
 0271                  6320  1 3522 0            TCF      ARCSIN          04 - ARC SIN.
 0272                  6321  1 3524 0            TCF      ARCCOS          05 - ARC COS.
 0273                  6322  1 3107 0            TCF      DSQ             06 - DP SQUARE.
 0274                  6323  1 3111 1            TCF      ROUND           07 - ROUND TO DP.

 0275                  6324  1 7605 1            TCF      COMP            10 - COMPLEMENT VECTOR OR SCALAR.
 0276                  6325  1 3150 1            TCF      VDEF            11 - VECTOR DEFINE.
 0277                  6326  1 2750 0            TCF      UNIT            12 - UNIT VECTOR.
 0278                  6327  1 3114 1            TCF      ABVALABS        13 - LENGTH OF VECTOR OR MAG OF SCALAR.
 0279                  6330  1 3164 0            TCF      VSQ             14 - SQUARE OF LENGTH OF VECTOR.
 0280                  6331  1 6334 1            TCF      STADR           15 - PUSH UP ON STORE CODE.
 0281                  6332  1 3214 1            TCF      RVQ             16 - RETURN VIA QPRET.
 0282                  6333  1 3167 0            TCF      PUSH            17 - PUSH MPAC DOWN.
```

```
P0283   SECTION 2  LOAD AND STORE PACKAGE.

R0284             A SET OF SIXTEEN STORE CODES ARE PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE
R0286   ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A
R0288   STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD
R0290   FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE:

R0292             1. STORE                STORE MPAC. THE E ADDRESS MAY BE INDEXED.
R0294             2. STODL                STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (EITHER MAY BE INDEXED).
R0296             3. STOVL                STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).
R0298             4. STCALL               STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0300             STODL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.


 0302                     6334  3 0151 1  STADR    CA      BANKSET           THE STADR CODE (PUSHUP UP ON STORE
 0303                     6335  54 004 1           TS      FBANK             ADDRESS) ENTERS HERE.
 0304                     6336  24 150 0           INCR    LOC
 0305                     6337  50 150 0           INDEX   LOC               THE STORE CODE WAS STORE COMPLEMENTED TO
 0306                     6340  4 0000 0           CS      0                 MAKE IT LOOK LIKE AN OPCODE PAIR.

 0307                     6341  54 102 0  DOSTORE  TS      ADDRWD
 0308                     6342  7 6425 0           MASK    LOW10             ENTRY FROM DISPATCHER. SAVE THE ERASABLE
 0309                     6343  56 102 1           XCH     ADDRWD            ADDRESS AND JUMP ON THE STORE CODE NO.
 0310                     6344  7 6233 1           MASK    B11T14
 0311                     6345  0 0006 1           EXTEND
 0312                     6346  7 7641 1           MP      BIT6              EACH TRANSFER VECTOR ENTRY IS TWO WORDS.
 0313                     6347  50 000 1           INDEX   A
 0314                     6350  1 6351 1           TCF     STORJUMP
```

```
P0315          STORE CODE JUMP TABLE, CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH
R0317    A SUPPLIED OPERATION CODE.

0318                          6351   0 6421 0   STORJUMP TC       STORE              STORE.
0319                          6352   1 6022 0            TCF      NEWOPS -1          PICK UP NEW OP CODE(S).
0320                          6353   0 6413 1            TC       STORE,1
0321                          6354   1 6022 0            TCF      NEWOPS -1
0322                          6355   0 6416 1            TC       STORE,2
0323                          6356   1 6022 0            TCF      NEWOPS -1

0324                          6357   0 6421 0            TC       STORE              STODL.
0325                          6360   1 6454 0            TCF      DODLOAD
0326                          6361   0 6413 1            TC       STORE,1
0327                          6362   1 6454 0            TCF      DODLOAD
0328                          6363   0 6416 1            TC       STORE,2
0329                          6364   1 6454 0            TCF      DODLOAD

0330                          6365   0 6421 0            TC       STORE              STODL WITH INDEXED LOAD ADDRESS.
0331                          6366   1 6071 0            TCF      DODLOAD*
0332                          6367   0 6413 1            TC       STORE,1
0333                          6370   1 6071 0            TCF      DODLOAD*
0334                          6371   0 6416 1            TC       STORE,2
0335                          6372   1 6071 0            TCF      DODLOAD*

0336                          6373   0 6421 0            TC       STORE              STOVL.
0337                          6374   1 6457 0            TCF      DOVLOAD
0338                          6375   0 6413 1            TC       STORE,1
0339                          6376   1 6457 0            TCF      DOVLOAD
0340                          6377   0 6416 1            TC       STORE,2
0341                          6400   1 6457 0            TCF      DOVLOAD

0342                          6401   0 6421 0            TC       STORE              STOVL WITH INDEXED LOAD ADDRESS.
0343                          6402   1 6462 0            TCF      DOVLOAD*
0344                          6403   0 6413 1            TC       STORE,1
0345                          6404   1 6462 0            TCF      DOVLOAD*
0346                          6405   0 6416 1            TC       STORE,2
0347                          6406   1 6462 0            TCF      DOVLOAD*

0348                          6407   0 6421 0            TC       STORE              STOTC.
0349                          6410   3 7657 1            CAF      CALLCODE
0350                          6411  54 020 1             TS       CYR
0351                          6412   1 6172 1            TCF      15BITADR           GET A 15 BIT ADDRESS.
```

```
P0352           STORE CODE ADDRESS PROCESSOR.

 0353                              6413  50 104 1  STORE,1   INDEX   FIXLOC
 0354                              6414  4 0046 1            CS      X1
 0355                              6415  1 6420 0            TCF     PRESTORE

 0356                              6416  50 104 1  STORE,2   INDEX   FIXLOC
 0357                              6417  4 0047 0            CS      X2
 0358                              6420  26 102 0  PRESTORE  ADS     ADDRWD         RESULTANT ADDRESS IS IN ERASABLE.

 0359                              6421  3 0102 1  STORE     CA      ADDRWD         SEE IF ADDRESS RELATIVE TO WORK AREA.
 0360                              6422  6 6171 0            AD      -ENDVAC
 0361                              6423  10 000 0            CCS     A
 0362                              6424  1 6430 1            TCF     STARTSTO       ADDRESS OK AS IS.

 0363                              6425   01777 1  LOW10     OCT     1777

 0364                              6426  3 0104 1            CA      FIXLOC         GIVEN ADDRESS IS RELATIVE TO WORK AREA.
 0365                              6427  26 102 0            ADS     ADDRWD
```

```
P0366           STORING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

 0367                     6430   0 0006 1  STARTSTO EXTEND                    MPAC,+1 MUST BE STORED IN ANY EVENT.
 0368                     6431   3 0141 0           DCA      MPAC
 0369                     6432  50 102 1            INDEX    ADDRWD
 0370                     6433  52 001 1            DXCH     0

 0371                     6434  10 147 1            CCS      MODE
 0372                     6435   1 6450 1           TCF      TSTORE
 0373                     6436   0 0002 0           TC       Q

 0374                     6437   0 0006 1  VSTORE   EXTEND
 0375                     6440   3 0144 0           DCA      MPAC +3
 0376                     6441  50 102 1            INDEX    ADDRWD
 0377                     6442  52 003 0            DXCH     2

 0378                     6443   0 0006 1           EXTEND
 0379                     6444   3 0146 1           DCA      MPAC +5
 0380                     6445  50 102 1            INDEX    ADDRWD
 0381                     6446  52 005 0            DXCH     4
 0382                     6447   0 0002 0           TC       Q

 0383                     6450   3 0142 0  TSTORE   CA       MPAC +2
 0384                     6451  50 102 1            INDEX    ADDRWD
 0385                     6452  54 002 1            TS       2
 0386                     6453   0 0002 0           TC       Q
```

```
P0387           ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE-TYPE CODES EXCEPT STORE
R0389   ITSELF.

 0390                          6454  3 7660 0  DODLOAD   CAF     DLOADCOD
 0391                          6455  54 020 1            TS      CYR
 0392                          6456  1 6041 0            TCF     DIRADRES          GO GET A DIRECT ADDRESS.

 0393                          6457  3 7630 0  DOVLOAD   CAF     VLOADCOD
 0394                          6460  54 020 1            TS      CYR
 0395                          6461  1 6041 0            TCF     DIRADRES

 0396                          6462  3 6042 1  DOVLOAD*  CAF     VLOAD*
 0397                          6463  1 6072 0            TCF     DODLOAD* +1       PROLOGUE TO INDEX ROUTINE.
```

```
P0398         THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

0400                      6464  0 0006 1  DLOAD    EXTEND
0401                      6465  5 0102 1           INDEX    ADDRWD
0402                      6466  3 0001 0           DCA      0                    PICK UP DP ARGUMENT AND LEAVE IT IN
0403                      6467  52 141 1  SLOAD2   DXCH     MPAC                 MPAC,+1, SETTING MPAC +2 TO ZERO. THE
0404                      6470  3 7653 0           CAF      ZERO                 CONTENTS OF THE OTHER FOUR REGISTERS OF
0405                      6471  54 142 1           TS       MPAC +2              MPAC ARE IRRELEVANT.
0406                      6472  1 6013 1           TCF      NEWMODE              DECLARE DOUBLE PRECISION MODE.

0407                      6473  50 102 1  TLOAD    INDEX    ADDRWD
0408                      6474  3 0002 0           CA       2                    LOAD A TRIPLE PRECISION ARGUMENT INTO
0409                      6475  54 142 1           TS       MPAC +2              THE FIRST THREE MPAC REGISTERS, WITH THE
0410                      6476  0 0006 1           EXTEND                        CONTENTS OF THE OTHER FOUR IRRELEVANT.
0411                      6477  5 0102 1           INDEX    ADDRWD
0412                      6500  3 0001 0           DCA      0
0413                      6501  52 141 1           DXCH     MPAC
0414                      6502  3 7646 1           CAF      ONE
0415                      6503  1 6013 1           TCF      NEWMODE              DECLARE TRIPLE PRECISION MODE.

0416                      6504  22 007 0  SLOAD    ZL                            LOAD A SINGLE PRECISION NUMBER INTO
0417                      6505  50 102 1           INDEX    ADDRWD               MPAC, SETTING MPAC+1,2 TO ZERO. THE
0418                      6506  3 0000 1           CA       0                    CONTENTS OF THE REMAINING MPAC REGISTERS
0419                      6507  1 6467 0           TCF      SLOAD2               ARE IRRELEVANT.

0420                      6510  0 0006 1  VLOAD    EXTEND                        LOAD A DOUBLE PRECISION VECTOR INTO
0421                      6511  5 0102 1           INDEX    ADDRWD               MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
0422                      6512  3 0001 0           DCA      0                    CONTENTS OF MPAC +2 ARE IRRELEVANT.
0423                      6513  52 141 1           DXCH     MPAC

0424                      6514  0 0006 1  ENDVLOAD EXTEND                        PDVL COMES HERE TO FINISH UP FOR DP, TP.
0425                      6515  5 0102 1           INDEX    ADDRWD
0426                      6516  3 0003 1           DCA      2
0427                      6517  52 144 1           DXCH     MPAC +3

0428                      6520  0 0006 1   +4      EXTEND                        TPDVL FINISHES HERE.
0429                      6521  5 0102 1           INDEX    ADDRWD
0430                      6522  3 0005 1           DCA      4
0431                      6523  52 146 0           DXCH     MPAC +5

0432                      6524  4 7646 0           CS       ONE                  DECLARE VECTOR MODE.
0433                      6525  1 6013 1           TCF      NEWMODE
```

```
P0434           THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0436           1.  PUSH                    PUSHDOWN AND NO LOAD.
R0437           2.  PDDL                    PUSHDOWN AND DOUBLE PRECISION LOAD.
R0438           3.  PDVL                    PUSHDOWN AND VECTOR LOAD.

 0439                     6526  0 0006 1  PDDL      EXTEND
 0440                     6527  5 0102 1            INDEX   ADDRWD         LOAD MPAC,+1, PUSHING THE FORMER
 0441                     6530  3 0001 0            DCA     0              CONTENTS DOWN.
 0442                     6531  52 141 1            DXCH    MPAC
 0443                     6532  50 152 1            INDEX   PUSHLOC
 0444                     6533  52 001 1            DXCH    0

 0445                     6534  50 147 0            INDEX   MODE           ADVANCE THE PUSHDOWN POINTER APPRO-
 0446                     6535  3 6164 1            CAF     NO.WDS         PRIATELY.
 0447                     6536  26 152 0            ADS     PUSHLOC

 0448                     6537  10 147 1            CCS     MODE
 0449                     6540  1 6555 0            TCF     ENDTPUSH
 0450                     6541  1 6553 0            TCF     ENDDPUSH

 0451                     6542  54 147 1            TS      MODE           NOW DP.
 0452                     6543  54 142 1  ENDVPUSH  TS      MPAC +2
 0453                     6544  52 144 1            DXCH    MPAC +3        PUSH DOWN THE REST OF THE VECTOR HERE.
 0454                     6545  50 152 1            INDEX   PUSHLOC
 0455                     6546  51'775 0            DXCH    0 -4

 0456                     6547  52 146 0            DXCH    MPAC +5
 0457                     6550  50 152 1            INDEX   PUSHLOC
 0458                     6551  51'777 1            DXCH    0 -2

 0459                     6552  1 6014 0            TCF     DANZIG

 0460                     6553  54 142 1  ENDDPUSH  TS      MPAC +2        SET MPAC +2 TO ZERO AND EXIT ON DP.
 0461                     6554  1 6014 0            TCF     DANZIG

 0462                     6555  54 147 1  ENDTPUSH  TS      MODE
 0463                     6556  56 142 0            XCH     MPAC +2        ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING
 0464                     6557  50 152 1   +2       INDEX   PUSHLOC        DOWN THE OLD CONTENTS
 0465                     6560  53'777 0            TS      0 -1
 0466                     6561  1 6014 0            TCF     DANZIG
```

```
P0467            PDVL - PUSHDOWN AND VECTOR LOAD.

 0468                    6562  0 0006 1  PDVL     EXTEND              RELOAD MPAC AND PUSH DOWN ITS CONTENTS.
 0469                    6563  5 0102 1           INDEX   ADDRWD
 0470                    6564  3 0001 0           DCA     0
 0471                    6565  52 141 1           DXCH    MPAC
 0472                    6566  50 152 1           INDEX   PUSHLOC
 0473                    6567  52 001 1           DXCH    0

 0474                    6570  50 147 0           INDEX   MODE        ADVANCE THE PUSHDOWN POINTER.
 0475                    6571  3 6164 1           CAF     NO.WDS
 0476                    6572  26 152 0           ADS     PUSHLOC

 0477                    6573  10 147 1           CCS     MODE        TEST PAST MODE.
 0478                    6574  1 6613 1           TCF     TPDVL
 0479                    6575  1 6514 0           TCF     ENDVLOAD    JUST LOAD LAST FOUR REGISTERS ON DP.

 0480                    6576  0 0006 1  VPDVL    EXTEND              PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS
 0481                    6577  5 0102 1           INDEX   ADDRWD
 0482                    6600  3 0003 1           DCA     2
 0483                    6601  52 144 1           DXCH    MPAC +3
 0484                    6602  50 152 1           INDEX   PUSHLOC
 0485                    6603  51'775 0           DXCH    0 -4

 0486                    6604  0 0006 1           EXTEND
 0487                    6605  5 0102 1           INDEX   ADDRWD
 0488                    6606  3 0005 1           DCA     4
 0489                    6607  52 146 0           DXCH    MPAC +5
 0490                    6610  50 152 1           INDEX   PUSHLOC
 0491                    6611  51'777 1           DXCH    0 -2

 0492                    6612  1 6014 0           TCF     DANZIG

 0493                    6613  0 0006 1  TPDVL    EXTEND              ON TP, WE MUST LOAD THE Y COMPONENT
 04931                   6614  5 0102 1           INDEX   ADDRWD      BEFORE STORING MPAC +2 INCASE THIS IS A
 04932                   6615  3 0003 1           DCA     2           PUSHUP.
 04933                   6616  52 144 1           DXCH    MPAC +3

 04934                   6617  3 0142 0           CA      MPAC +2
 0494                    6620  50 152 1           INDEX   PUSHLOC     IN DP.
 0495                    6621  53'777 0           TS      0 -1
 0496                    6622  1 6520 1           TCF     ENDVLOAD +4

R0497            SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.

 0498                    6623  24 150 0  SSP      INCR    LOC         PICK UP THE WORD FOLLOWING THE GIVEN
 0499                    6624  50 150 0           INDEX   LOC         ADDRESS AND STORE IT AT X.
 0500                    6625  3 0000 1           CA      0
 0501                    6626  50 102 1  STORE1   INDEX   ADDRWD      SOME INDEX AND MISCELLANEOUS OPS END
 0502                    6627  54 000 0           TS      0           HERE.
```

```
0503                        6630  1 6014 0          TCF     DANZIG
```

```
        LIST-PROCESSING INTERPRETER                                                        USER'S OWN PAGE NO.  21

P0504   SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0505           THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0507           1.  GOTO                GO TO.
R0508           2.  CALL                CALL SUBROUTINE SETTING QPRET.
R0509           3.  CGOTO               COMPUTED GO TO.
R0510           4.  CCALL               COMPUTED CALL.
R0511           7.  BPL                 BRANCH IF MPAC POSITIVE OR ZERO.
R0512           8.  BZE                 BRANCH IF MPAC ZERO.
R0513           9.  BMN                 BRANCH IF MPAC NEGATIVE NON-ZERO.

 0514                        6631  24 150 0  CCALL      INCR    LOC              MAINTAIN LOC FOR QPRET COMPUTATION.
 0515                        6632  50 150 0             INDEX   LOC
 0516                        6633  3 0000 1             CAF     0                GET BASE ADDRESS OF CADR LIST.
 0517                        6634  50 102 1             INDEX   ADDRWD
 0518                        6635  6 0000 1             AD      0                ADD INCREMENT.
 0519                        6636  54 004 1             TS      FBANK            SELECT DESIRED CADR.
 0520                        6637  7 6425 0             MASK    LOW10
 0521                        6640  50 000 1             INDEX   A
 0522                        6641  3 2000 0             CAF     10000
 0523                        6642  54 103 1   -1        TS      POLISH

 0524                        6643  4 6425 0  CALL       CS      LOW10            FOR ANY OF THE CALL OPTIONS, MAKE UP THE
 0525                        6644  6 0150 0             AD      LOC              ADDRESS OF THE NEXT OP-CODE PAIR/STORE
 0526                        6645  6 0151 1             AD      BANKSET          CODE AND LEAVE IT IN QPRET. NOTE THAT
 0527                        6646  50 104 1             INDEX   FIXLOC           LOW10 = 2000 - 1.
 0528                        6647  54 052 1             TS      QPRET

 0529                        6650  3 0103 0  GOTO       CA      POLISH           BASIC BRANCHING SEQUENCE.
 0530                        6651  54 004 1             TS      FBANK
 0531                        6652  7 6425 0             MASK    LOW10            MAKE UP 12 BIT SUB-ADDRESS AND FALL INTO
 0532                        6653  6 7634 1             AD      2K               FALL INTO THE INTPRET ENTRY UNLESS THE
 0533                        6654  54 150 1             TS      LOC              GIVEN ADDRESS WAS IN ERASABLE, IN WHICH
 0534                        6655  10 004 1             CCS     FBANK            CASE IT IS USED AS THE ADDRESS OF THE
 0535                        6656  1 6002 1             TCF     INTPRET +2       BRANCH ADDRESS.
 0536                        6657  1 6661 1             TCF     +2
 0537                        6660  1 6002 1             TCF     INTPRET +2
```

```
6661  4 0150 1           CS     LOC          THE GIVEN ADDRESS IS IN ERASABLE - SEE
6662  6 6707 1           AD     EVAC+2K      IF RELATIVE TO THE WORK AREA.
6663  10 000 0           CCS    A
6664  3 0104 1           CA     FIXLOC       ADD FIXLOC IF SO.
6665  26 150 1           ADS    LOC

6666  50 150 0           INDEX  LOC
6667  2'6000 0           CA     0 -2000      (ADDRESS HAD BEEN AUGMENTED BY 2000.)
6670  1 6651 1           TCF    GOTO +1      ALLOWS ARBITRARY INDIRECTNESS.

6671  50 150 0  CGOTO    INDEX  LOC          COMPUTED GO TO. PICK UP ADDRESS OF CADR
6672  3 0001 0           CA     1            LIST.
6673  50 102 1           INDEX  ADDRWD       ADD MODIFIER.
6674  6 0000 1           AD     0
6675  54 004 1           TS     FBANK        SELECT GOTO ADDRESS.
6676  7 6425 0           MASK   LOW10
6677  50 000 1           INDEX  A
6700  3 2000 0           CA     10000
6701  1 6651 1           TCF    GOTO +1      WITH ADDRESS IN A.

6702  3 0151 1  SWBRANCH CA     BANKSET      SWITCH INSTRUCTIONS WHICH ELECT TO
6703  54 004 1           TS     FBANK        BRANCH COME HERE TO DO SO.
6704  50 150 0           INDEX  LOC
6705  3 0001 0           CA     1
6706  1 6651 1           TCF    GOTO +1

6707   02055 0  EVAC+2K  DEC    1069         =1024+45
```

```
P0561             TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS:

R0563             L+1  IF MPAC IS GREATER THAN ZERO.
R0564             L+2  IF MPAC IS EQUAL TO +0 OR -0.
R0565             L+3  IF MPAC IS LESS THAN ZERO.


 0566                         6710  10 140 0  BRANCH    CCS     MPAC
 0567                         6711  0 0002 0            TC      Q
 0568                         6712  1 6714 1            TCF     +2                ON ZERO.
 0569                         6713  1 6726 0            TCF     NEG

 0570                         6714  10 141 1            CCS     MPAC +1
 0571                         6715  0 0002 0            TC      Q
 0572                         6716  1 6720 0            TCF     +2
 0573                         6717  1 6726 0            TCF     NEG

 0574                         6720  10 142 1            CCS     MPAC +2
 0575                         6721  0 0002 0            TC      Q
 0576                         6722  1 6724 1            TCF     +2
 0577                         6723  1 6726 0            TCF     NEG

 0578                         6724  50 002 0            INDEX   Q                 IF ALL THREE REGISTERS WERE +-0.
 0579                         6725  0 0001 0            TC      1

 0580                         6726  50 002 0  NEG       INDEX   Q                 IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
 0581                         6727  0 0002 0            TC      2


 0582                         6730  50 150 0  EXIT      INDEX   LOC               LEAVE INTERPRETIVE MODE.
 0583                         6731  1 0001 1            TCF     1
```

```
P0584    SECTION 3 - ADD/SUBTRACT PACKAGE.

R0585              THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR
R0587    MPAC:

R0588              1.   DAD                  DOUBLE PRECISION ADD.
R0589              2.   DSU                  DOUBLE PRECISION SUBTRACT.
R0590              3.   BDSU                 DOUBLE PRECISION SUBTRACT FROM.

R0591              4.   TAD                  TRIPLE PRECISION ADD.

R0592              5.   VAD                  VECTOR ADD.
R0593              6.   VSU                  VECTOR SUBTRACT.
R0594              7.   BVSU                 VECTOR SUBTRACT FROM.

R0595    THE INTERPRETIVE OVERFLOW INDICATOR OVFIND IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.


 0597                       6732  0 0006 1  VAD      EXTEND
 0598                       6733  5 0102 1           INDEX    ADDRWD
 0599                       6734  3 0003 1           DCA      2
 0600                       6735  20 144 1           DAS      MPAC +3
 0601                       6736  0 0006 1           EXTEND                     CHECK OVERFLOW.
 0602                       6737  1 6741 1           BZF      +2
 0603                       6740  0 7006 0           TC       OVERFLOW

 0604                       6741  0 0006 1           EXTEND
 0605                       6742  5 0102 1           INDEX    ADDRWD
 0606                       6743  3 0005 1           DCA      4
 0607                       6744  20 146 0           DAS      MPAC +5
 0608                       6745  0 0006 1           EXTEND
 0609                       6746  1 6750 1           BZF      +2
 0610                       6747  0 7006 0           TC       OVERFLOW

 0611                       6750  0 0006 1  DAD      EXTEND
 0612                       6751  5 0102 1           INDEX    ADDRWD
 0613                       6752  3 0001 0           DCA      0
 0614                       6753  20 141 1  ENDVXV   DAS      MPAC              VXV FINISHES HERE.
 0615                       6754  0 0006 1           EXTEND
 0616                       6755  1 6014 0           BZF      DANZIG
 0617                       6756  0 7006 0           TC       OVERFLOW
 0618                       6757  1 6014 0           TCF      DANZIG
```

```
0619                     6760  0 0006 1  VSU       EXTEND
0620                     6761  5 0102 1            INDEX    ADDRWD
0621                     6762  4 0003 0            DCS      2
0622                     6763  20 144 1            DAS      MPAC +3
0623                     6764  0 0006 1            EXTEND
0624                     6765  1 6767 0            BZF      +2
0625                     6766  0 7006 0            TC       OVERFLOW

0626                     6767  0 0006 1            EXTEND
0627                     6770  5 0102 1            INDEX    ADDRWD
0628                     6771  4 0005 0            DCS      4
0629                     6772  20 146 0            DAS      MPAC +5
0630                     6773  0 0006 1            EXTEND
0631                     6774  1 6776 0            BZF      +2
0632                     6775  0 7006 0            TC       OVERFLOW

0633                     6776  0 0006 1  DSU       EXTEND
0634                     6777  5 0102 1            INDEX    ADDRWD
0635                     7000  4 0001 1            DCS      0
0636                     7001  20 141 1            DAS      MPAC
0637                     7002  0 0006 1            EXTEND
0638                     7003  1 6014 0            BZF      DANZIG
0639                     7004  0 7006 0            TC       OVERFLOW
0640                     7005  1 6014 0            TCF      DANZIG

0641                     7006  3 7646 1  OVERFLOW  CAF      ONE           SUBROUTINE TO TURN OVFIND ON.
0642                     7007  1 7130 0            TCF      SETOVF2
```

```
7010  0 0006 1   BVSU     EXTEND
7011  5 0102 1            INDEX    ADDRWD
7012  3 0003 1            DCA      2
7013  52 144 1            DXCH     MPAC +3
7014  0 0006 1            EXTEND
7015  4 0001 1            DCOM
7016  20 144 1            DAS      MPAC +3
7017  0 0006 1            EXTEND
7020  1 7022 1            BZF      +2
7021  0 7006 0            TC       OVERFLOW

7022  0 0006 1            EXTEND
7023  5 0102 1            INDEX    ADDRWD
7024  3 0005 1            DCA      4
7025  52 146 0            DXCH     MPAC +5
7026  0 0006 1            EXTEND
7027  4 0001 1            DCOM
7030  20 146 0            DAS      MPAC +5
7031  0 0006 1            EXTEND
7032  1 7034 0            BZF      +2
7033  0 7006 0            TC       OVERFLOW

7034  0 0006 1   BDSU     EXTEND
7035  5 0102 1            INDEX    ADDRWD
7036  3 0001 0            DCA      0
7037  52 141 1            DXCH     MPAC
7040  0 0006 1            EXTEND
7041  4 0001 1            DCOM
7042  20 141 1            DAS      MPAC
7043  0 0006 1            EXTEND
7044  1 6014 0            BZF      DANZIG
7045  0 7006 0            TC       OVERFLOW
7046  1 6014 0            TCF      DANZIG
```

```
P0674          TRIPLE PRECISION ADD ROUTINE.

 0675                    7047  0 0006 1  TAD       EXTEND
 0676                    7050  5 0102 1            INDEX   ADDRWD
 0677                    7051  3 0002 0            DCA     1                ADD MINOR PARTS FIRST.
 0678                    7052  20 142 1            DAS     MPAC +1
 0679                    7053  50 102 1            INDEX   ADDRWD
 0680                    7054  6 0000 1            AD      0
 0681                    7055  6 0140 1            AD      MPAC
 0682                    7056  54 140 0            TS      MPAC
 0683                    7057  1 6014 0            TCF     DANZIG

 0684                    7060  54 105 1  SETOVF    TS      OVFIND           SET OVFIND IF SUCH OCCURS.
 0685                    7061  1 6014 0            TCF     DANZIG
```

```
ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

          1.  DMPSUB     DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC,+1 BY THE DP WORD WHOSE ADDRESS
                         IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.
          2.  ROUNDSUB   ROUND THE TRIPLE PRECISON CONTENTS OF MPAC TO DOUBLE PRECISION.
          3.  DOTSUB     TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD
                         AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.
          4.  POLY       USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND
                         COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION (SEE ROUTINE FOR DETAILS.)


7062  50 002 0  DMP      INDEX   Q              BASIC SUBROUTINE FOR USE BY PINBALL, ETC
7063  3 0000 1           CAF     0              ADRES OF ARGUMENT FOLLOWS  TC DMP  .
7064  24 002 0           INCR    Q
7065  54 102 0   -1      TS      ADDRWD         (PROLOGUE FOR SETTING ADDRWD.)

7066  50 102 1  DMPSUB   INDEX   ADDRWD         GET MINOR PART OF OPERAND AT C(ADDRWD).
7067  3 0001 0           CA      1
7070  54 142 1           TS      MPAC +2        THIS WORKS FOR SQUARING MPAC AS WELL.
7071  3 7653 0           CAF     ZERO           SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE
7072  56 141 0           XCH     MPAC +1        THE PARTIAL PRODUCTS WITH DAS
7073  54 121 1           TS      MPTEMP         INSTRUCTIONS.
7074  0 0006 1           EXTEND
7075  7 0142 1           MP      MPAC +2        MINOR OF MPAC X MINOR OF C(ADDRWD).

7076  56 142 0           XCH     MPAC +2        DISCARD MINOR PART OF ABOVE RESULT AND
7077  0 0006 1           EXTEND                 FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
7100  7 0140 0           MP      MPAC
7101  20 142 1           DAS     MPAC +1        GUARANTEED NO OVERFLOW.

7102  50 102 1           INDEX   ADDRWD         GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
7103  3 0000 1           CA      0
7104  56 121 0           XCH     MPTEMP         SAVE AND BRING OUT MINOR OF MPAC.
7105  0 0006 1           EXTEND
7106  7 0121 1           MP      MPTEMP         MAJOR OF C(ADDRWD) X MINOR OF MPAC.
7107  20 142 1           DAS     MPAC +1        ACCUMULATE, SETTING A TO NET OVERFLOW.

7110  56 140 1           XCH     MPAC           SETTING MPAC TO 0 OR +-1.
7111  0 0006 1           EXTEND
7112  7 0121 1           MP      MPTEMP         MAJOR OF MPAC X MAJOR OF C(ADDRWD).
7113  20 141 1           DAS     MPAC           GUARANTEED NO OVERFLOW.
7114  0 0002 0           TC      Q              49 MCT = .573 MS. INCLUDING RETURN.
```

```
P0727            ROUND MPAC TO DOUBLE PRECISION, SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

 0729                        7115  3 7653 0  ROUNDSUB CAF     ZERO          SET MPAC +2 TO ZERO FOR SCALARS.

 0730                        7116  56 142 0  VROUND   XCH     MPAC +2       BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
 0731                        7117  6 0000 1           DOUBLE
 0732                        7120  54 001 1           TS      L
 0733                        7121  0 0002 0           TC      Q

 0734                        7122  6 0141 0           AD      MPAC +1       ADD ROUNDING BIT IF MPAC +2 WAS GREATER
 0735                        7123  54 141 1           TS      MPAC +1       THAN .5 IN MAGNITUDE.
 0736                        7124  0 0002 0           TC      Q

 0737                        7125  6 0140 1           AD      MPAC          PROPAGATE INTERFLOW.
 0738                        7126  54 140 0           TS      MPAC
 0739                        7127  0 0002 0           TC      Q

 0740                        7130  54 105 1  SETOVF2  TS      OVFIND        (RARE).
 0741                        7131  0 0002 0           TC      Q
```

```
         THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX
REGISTER VECTOR WHOSE ADDRESS IS IN ADDRWD. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO
6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.


7132  3 7645 1  PREDOT   CAF    TWO              PROLOGUE TO SET DOTINC TO 2.
7133  54 122 1           TS     DOTINC

7134  0 0006 1  DOTSUB   EXTEND
7135  22 123 1           QXCH   DOTRET           SAVE RETURN.
7136  0 7066 0           TC     DMPSUB           DOT X COMPONENTS.
7137  52 144 1           DXCH   MPAC +3          POSITION Y COMPONENT OF MPAC FOR
7140  52 141 1           DXCH   MPAC             MULTIPLICATION WHILE SAVING RESULT IN
7141  52 115 0           DXCH   BUF              THREE WORD BUFFER, BUF.
7142  3 0142 0           CA     MPAC +2
7143  54 116 0           TS     BUF +2

7144  3 0122 0           CA     DOTINC           ADVANCE ADDRWD TO Y COMPONENT OF
7145  26 102 0           ADS    ADDRWD           OTHER ARGUMENT.
7146  0 7066 0           TC     DMPSUB
7147  52 142 1           DXCH   MPAC +1          ACCUMULATE PARTIAL PRODUCTS.
7150  20 116 0           DAS    BUF +1
7151  6 0140 1           AD     MPAC
7152  6 0114 0           AD     BUF
7153  54 114 1           TS     BUF
7154  1 7156 0           TCF    +2
7155  54 105 1           TS     OVFIND           IF OVERFLOW OCCURS.

7156  52 146 0           DXCH   MPAC +5          MULTIPLY Z COMPONENTS.
7157  52 141 1           DXCH   MPAC
7160  3 0122 0           CA     DOTINC
7161  26 102 0           ADS    ADDRWD
7162  0 7066 0           TC     DMPSUB
7163  52 116 0  ENDDOT   DXCH   BUF +1           LEAVE FINAL ACCUMULATION IN MPAC.
7164  20 142 1           DAS    MPAC +1
7165  6 0140 1           AD     MPAC
7166  6 0114 0           AD     BUF
7167  54 140 0           TS     MPAC
7170  0 0123 1           TC     DOTRET

7171  54 105 1           TS     OVFIND           ON OVERFLOW HERE.
7172  0 0123 1           TC     DOTRET
```

```
        LIST-PROCESSING INTERPRETER                                                      USER'S OWN PAGE NO.  31

P0781   DOUBLE PRECISION POLYNOMIAL EVALUATOR.

                                               N        N-1
R0782           THIS ROUTINE EVALUATES A X   + A     X     + ... + A X + A LEAVING THE DP RESULT IN MPAC ON EXIT.
R0783                                    N     N-1                  1     0
R0785

R0786   IT IS ASSUMED THAT X ARRIVES IN MPAC AND N AND THE COEFFICIENTS IN THE CALLING SEQUENCE AS FOLLOWS:

A0788                                             L          TC      POLY
A0789                                             L+1        DEC     N-1
A0790                                             L+2        2DEC    A(0)
A0791                                                        ...
A0792                                             L+2N+2     2DEC    A(N)             RETURN IS TO L+2N+4.

 0793                              7173  3 7662 1 POLY       CAF     LVBUF            INCOMING X WILL BE STORED IN VBUF, SO
 0794                              7174  54 102 0            TS      ADDRWD           SET ADDRWD SO DMPSUB WILL MPY BY VBUF.

 0795                              7175  50 002 0            INDEX   Q
 0796                              7176  3 0000 1            CAF     0
 0797                              7177  54 124 1            TS      POLYCNT          N-1 TO COUNTER.
 0798                              7200  6 0000 1            DOUBLE
 0799                              7201  6 0002 0            AD      Q
 0800                              7202  54 125 0            TS      POLYRET          SAVE L+2N-1 FOR RETURN
 0801                              7203  54 103 1            TS      POLISH           AND FOR REFERENCING COEFFICIENTS.

 0802                              7204  0 0006 1            EXTEND
 0803                              7205  5 0000 1            INDEX   A                LOAD A(N) INTO MPAC, SAVING MPAC IN
 0804                              7206  3 0004 0            DCA     3                VBUF.
 0805                              7207  52 141 1            DXCH    MPAC
 0806                              7210  52 107 0            DXCH    VBUF
 0807                              7211  1 7215 1            TCF     POLY2            NO ZERO-ORDER POLYNOMIALS ALLOWED.

 0808                              7212  54 124 1 POLYLOOP   TS      POLYCNT          SAVE DECREMENTED LOOP COUNTER.
 0809                              7213  4 7645 0            CS      TWO              REGRESS COEFFICIENT POINTER.
 0810                              7214  26 103 1            ADS     POLISH

 0811                              7215  0 7066 0 POLY2      TC      DMPSUB           MULTIPLY BY X.
 0812                              7216  0 0006 1            EXTEND
 0813                              7217  5 0103 0            INDEX   POLISH           ADD IN NEXT COEFFICIENT.
 0814                              7220  3 0002 0            DCA     1
 0815                              7221  20 141 1            DAS     MPAC             NO CHECK FOR OVERFLOW SINCE SIN, ETC.,
A0816                                                                                 SHOULD NOT OVERFLOW.
 0817                              7222  10 124 1            CCS     POLYCNT          LOOP ON COUNTER.
 0818                              7223  1 7212 0            TCF     POLYLOOP
 0819                              7224  50 125 1            INDEX   POLYRET          DONE - RETURN TO CALLER AT L+2N+4.
 0820                              7225  0 0005 1 FIVE       TC      5
```

```
P0821          MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

 0823                       7226   0 0006 1  TPAGREE  EXTEND                      FORCE SIGN AGREEMENT AMONG THE TRIPLE-
 0824                       7227  22 114  0           QXCH     BUF                PRECISION CONTENTS OF MPAC, RETURNING
 0825                       7230   0 6710 1           TC       BRANCH             WITH THE SIGNUM OF THE INPUT IN A.
 0826                       7231   1 7235 0           TCF      ARG+
 0827                       7232   1 7255 0           TCF      ARGZERO

 0828                       7233   4 7626 0           CS       POSMAX             IF NEGATIVE.
 0829                       7234   1 7236 0           TCF      +2

 0830                       7235   3 7626 1  ARG+     CAF      POSMAX
 0831                       7236  54 115  0   +2      TS       BUF +1
 0832                       7237   0 0006 1           EXTEND
 0833                       7240  24 000  1           AUG      A                  FORMS +-1.0.
 0834                       7241   6 0142 0           AD       MPAC +2
 0835                       7242  54 142  1           TS       MPAC +2
 0836                       7243   3 7653 0           CAF      ZERO
 0837                       7244   6 0115 1           AD       BUF +1
 0838                       7245   6 0141 0           AD       MPAC +1
 0839                       7246  54 141  1           TS       MPAC +1
 0840                       7247   3 7653 0           CAF      ZERO
 0841                       7250   6 0115 1           AD       BUF +1
 0842                       7251   6 0140 1           AD       MPAC
 0843                       7252  54 140  0  ARGZERO2 TS       MPAC               ALWAYS SKIPPING UNLESS ARGZERO.
 0844                       7253  54 141  1           TS       MPAC +1
 0845                       7254   0 0114 0           TC       BUF                RETURN.

 0846                       7255  54 142  1  ARGZERO  TS       MPAC +2            SET ALL THREE MPAC REGISTERS TO ZERO.
 0847                       7256   1 7252 1           TCF      ARGZERO2

R0848          SHORTMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

 0850                       7257  54 121  1  SHORTMP  TS       MPTEMP
 0851                       7260   0 0006 1           EXTEND
 0852                       7261   7 0142 1           MP       MPAC +2
 0853                       7262  54 142  1           TS       MPAC +2
 0854                       7263   3 7653 0           CAF      ZERO               SO SUBSEQUENT DAS WILL WORK.
 0855                       7264  56 141  0           XCH      MPAC +1
 0856                       7265   0 0006 1           EXTEND
 0857                       7266   7 0121 1           MP       MPTEMP
 0858                       7267  20 142  1           DAS      MPAC +1
 0859                       7270  56 140  1           XCH      MPAC               SETTING MPAC TO 0.
 0860                       7271   0 0006 1           EXTEND
 0861                       7272   7 0121 1           MP       MPTEMP
 0862                       7273  20 141  1           DAS      MPAC
 0863                       7274   0 0002 0           TC       Q
```

```
P0864   MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0865             1.  DOT               DP VECTOR DOT PRODUCT.
R0866             2.  VXV               DP VECTOR CROSS PRODUCT.
R0867             3.  VXSC              DP VECTOR TIMES SCALAR.
R0868             4.  V/SC              DP VECTOR DIVIDED BY SCALAR.
R0869             5.  VPROJ             DP VECTOR PROJECTION. ( (MPAC.X)MPAC ).
R0870             6.  VXM               DP VECTOR POST-MULTIPLIED BY MATRIX.
R0871             7.  MXV               DP VECTOR PRE-MULTIPLIED BY MATRIX.


 0872                       7275  0 7132 0  DOT     TC     PREDOT         DO THE DOT PRODUCT AND EXIT, CHANGING
 0873                       7276  3 7653 0          CAF    ZERO           THE MODE TO DP SCALAR.
 0874                       7277  1 6013 1          TCF    NEWMODE


 0875                       7300  3 7645 1  MXV     CAF    TWO            SET UP MATINC AND DOTINC FOR ROW
 0876                       7301  54 124 1          TS     MATINC         VECTORS.
 0877                       7302  1 7306 1          TCF    VXM/MXV        GO TO COMMON PORTION.

 0878                       7303  4 7650 1  VXM     CS     TEN            SET MATINC AND DOTINC TO REFER TO MATRIX
 0879                       7304  54 124 1          TS     MATINC         AS THREE COLUMN VECTORS.
 0880                       7305  3 6162 1          CAF    SIX
```

```
P0881          COMMON PORTION OF MXV AND VXM.

 0882                        7306  54 122 1  VXM/MXV   TS     DOTINC
 0883                        7307  0 7475 0            TC     MPACVBUF        SAVE VECTOR IN MPAC FOR FURTHER USE.

 0884                        7310  0 7134 0            TC     DOTSUB          GO DOT TO GET X COMPONENT OF ANSWER.
 0885                        7311  0 0006 1            EXTEND
 0886                        7312  3 0107 1            DCA    VBUF            MOVE MPAC VECTOR BACK INTO MPAC, SAVING
 0887                        7313  52 141 1            DXCH   MPAC            NEW X COMPONENT IN BUF2.
 0888                        7314  52 120 0            DXCH   BUF2
 0889                        7315  0 0006 1            EXTEND
 0890                        7316  3 0111 0            DCA    VBUF +2
 0891                        7317  52 144 1            DXCH   MPAC +3
 0892                        7320  0 0006 1            EXTEND
 0893                        7321  3 0113 1            DCA    VBUF +4
 0894                        7322  52 146 0            DXCH   MPAC +5
 0895                        7323  3 0124 0            CA     MATINC          INITIALIZE ADDRWD FOR NEXT DOT PRODUCT.
 0896                        7324  26 102 0            ADS    ADDRWD          FORMS BASE ADDRESS OF NEXT COLUMN(ROW).

 0897                        7325  0 7134 0            TC     DOTSUB
 0898                        7326  52 107 0            DXCH   VBUF            MOVE GIVEN VECTOR BACK TO MPAC, SAVING Y
 0899                        7327  52 141 1            DXCH   MPAC            COMPONENT OF ANSWER IN VBUF +2.
 0900                        7330  52 111 1            DXCH   VBUF +2
 0901                        7331  52 144 1            DXCH   MPAC +3
 0902                        7332  52 113 0            DXCH   VBUF +4
 0903                        7333  52 146 0            DXCH   MPAC +5
 0904                        7334  3 0124 0            CA     MATINC          FORM ADDRESS OF LAST COLUMN OR ROW.
 0905                        7335  26 102 0            ADS    ADDRWD

 0906                        7336  0 7134 0            TC     DOTSUB
 0907                        7337  52 120 0            DXCH   BUF2            ANSWER NOW COMPLETE. PUT COMPONENTS INTO
 0908                        7340  52 141 1            DXCH   MPAC            PROPER MPAC REGISTERS.
 0909                        7341  52 146 0            DXCH   MPAC +5
 0910                        7342  52 111 1            DXCH   VBUF +2
 0911                        7343  52 144 1            DXCH   MPAC +3
 0912                        7344  1 6014 0            TCF    DANZIG          EXIT.
```

```
P0913          VXSC - VECTOR TIMES SCALAR.

 0914                    7345  10 147 1  VXSC      CCS      MODE                TEST PRESENT MODE.
 0915                    7346   1 7372 1           TCF      DVXSC               SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
 0916                    7347   1 7372 1           TCF      DVXSC

 0917                    7350   0 7066 0  VVXSC     TC       DMPSUB              COMPUTE X COMPONENT
 0918                    7351   0 7116 0           TC       VROUND              AND ROUND IT.
 0919                    7352  52 144 1            DXCH     MPAC +3             PUT Y COMPONENT INTO MPAC SAVING MPAC IN
 0920                    7353  52 141 1            DXCH     MPAC                MPAC +3.
 0921                    7354  52 144 1            DXCH     MPAC +3

 0922                    7355   0 7066 0           TC       DMPSUB              DO SAME FOR Y AND Z COMPONENTS.
 0923                    7356   0 7116 0           TC       VROUND
 0924                    7357  52 146 0            DXCH     MPAC +5
 0925                    7360  52 141 1            DXCH     MPAC
 0926                    7361  52 146 0            DXCH     MPAC +5

 0927                    7362   0 7066 0           TC       DMPSUB
 0928                    7363   0 7116 0           TC       VROUND
 0929                    7364  52 141 1  VROTATEX  DXCH     MPAC                EXIT USED TO RESTORE MPAC AFTER THIS
 0930                    7365  52 146 0            DXCH     MPAC +5             TYPE OF ROTATION. CALLED BY VECTOR SHIFT
 0931                    7366  52 144 1            DXCH     MPAC +3             RIGHT, V/SC, ETC.
 0932                    7367  52 141 1            DXCH     MPAC
 0933                    7370   1 6014 0           TCF      DANZIG
```

```
P0934              DP VECTOR PROJECTION ROUTINE.

 0935                           7371  0 7132 0  VPROJ     TC      PREDOT            (MPAC.X)MPAC IS COMPUTED AND LEFT IN
A0936                                                                               MPAC. DO DOT AND FALL INTO DVXSC.

R0937              VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.

 0938                           7372  0 0006 1  DVXSC     EXTEND                    SAVE SCALAR IN MPAC +3 AND GET X
 0939                           7373  3 0141 0            DCA     MPAC              COMPONENT OF ANSWER.
 0940                           7374  52 144 1            DXCH    MPAC +3
 0941                           7375  0 7066 0            TC      DMPSUB
 0942                           7376  0 7116 0            TC      VROUND

 0943                           7377  3 7645 1            CAF     TWO               ADVANCE ADDRWD TO Y COMPONENT OF X.
 0944                           7400  26 102 0            ADS     ADDRWD
 0945                           7401  0 0006 1            EXTEND
 0946                           7402  3 0144 0            DCA     MPAC +3           PUT SCALAR BACK INTO MPAC AND SAVE
 0947                           7403  52 141 1            DXCH    MPAC              X RESULT IN MPAC +5.
 0948                           7404  52 146 0            DXCH    MPAC +5
 0949                           7405  0 7066 0            TC      DMPSUB
 0950                           7406  0 7116 0            TC      VROUND

 0951                           7407  3 7645 1            CAF     TWO
 0952                           7410  26 102 0            ADS     ADDRWD            TO Z COMPONENT.
 0953                           7411  52 144 1            DXCH    MPAC +3           BRING SCALAR BACK, PUTTING Y RESULT IN
 0954                           7412  52 141 1            DXCH    MPAC              THE PROPER PLACE.
 0955                           7413  52 144 1            DXCH    MPAC +3
 0956                           7414  0 7066 0            TC      DMPSUB
 0957                           7415  0 7116 0            TC      VROUND

 0958                           7416  52 141 1            DXCH    MPAC              PUT Z COMPONENT IN PROPER PLACE, ALSO
 0959                           7417  52 146 0            DXCH    MPAC +5           POSITIONING X.
 0960                           7420  52 141 1            DXCH    MPAC

 0961                           7421  4 7646 0            CS      ONE               MODE HAS CHANGED TO VECTOR.
 0962                           7422  1 6013 1            TCF     NEWMODE
```

```
R0963           THE VECTOR CROSS PRODUCT ROUTINE CALCULATES (X M -X M .X M -X M .X M -X M ) WHERE M IS THE VECTOR IN
R0965                                                         3 2  2 3  1 3  3 1  2 1  1 2
R0967     MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.


 0968                     7423  0 0006 1  VXV      EXTEND
 0969                     7424  3 0146 1           DCA       MPAC +5          FORM UP M3X1, LEAVING M1 IN VBUF.
 0970                     7425  52 141 1           DXCH      MPAC
 0971                     7426  52 107 0           DXCH      VBUF
 0972                     7427  0 7066 0           TC        DMPSUB           BY X1.

 0973                     7430  0 0006 1           EXTEND
 0974                     7431  4 0144 1           DCS       MPAC +3          CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
 0975                     7432  52 141 1           DXCH      MPAC
 0976                     7433  52 111 1           DXCH      VBUF +2
 0977                     7434  0 7066 0           TC        DMPSUB

 0978                     7435  3 7645 1           CAF       TWO              ADVANCE ADDRWD TO X2.
 0979                     7436  26 102 0           ADS       ADDRWD
 0980                     7437  0 0006 1           EXTEND
 0981                     7440  4 0146 0           DCS       MPAC +5          PREPARE TO GET -X2M3, SAVING -X1M2 IN
 0982                     7441  52 141 1           DXCH      MPAC             MPAC +5.
 0983                     7442  52 146 0           DXCH      MPAC +5
 0984                     7443  0 7066 0           TC        DMPSUB

 0985                     7444  0 0006 1           EXTEND
 0986                     7445  3 0107 1           DCA       VBUF             GET X2M1, SAVING -X2M3 IN VBUF +4.
 0987                     7446  52 141 1           DXCH      MPAC
 0988                     7447  52 113 0           DXCH      VBUF +4
 0989                     7450  0 7066 0           TC        DMPSUB

 0990                     7451  3 7645 1           CAF       TWO              ADVANCE ADDRWD TO X3.
 0991                     7452  26 102 0           ADS       ADDRWD
 0992                     7453  0 0006 1           EXTEND
 0993                     7454  4 0107 0           DCS       VBUF             GET -X3M1, ADDING X2M1 TO MPAC +5 TO
 0994                     7455  52 141 1           DXCH      MPAC             COMPLETE THE Z COMPONENT OF THE ANSWER,
 0995                     7456  20 146 0           DAS       MPAC +5

 0996                     7457  0 0006 1           EXTEND
 0997                     7460  1 7462 1           BZF       +2
 0998                     7461  0 7006 0           TC        OVERFLOW
```

```
0999                     7462  0 7066 0            TC      DMPSUB
1000                     7463  52 111 1            DXCH    VBUF +2          MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
1001                     7464  52 144 1            DXCH    MPAC +3          AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
1002                     7465  52 141 1            DXCH    MPAC             Y COMPONENT OF THE RESULT.
1003                     7466  20 144 1            DAS     MPAC +3

1004                     7467  0 0006 1            EXTEND
1005                     7470  1 7472 0            BZF     +2
1006                     7471  0 7006 0            TC      OVERFLOW

1007                     7472  0 7066 0            TC      DMPSUB
1008                     7473  52 113 0            DXCH    VBUF +4          GO ADD -X2M3 TO X3M2 TO COMPLETE THE X
1009                     7474  1 6753 1            TCF     ENDVXV           COMPONENT (TAIL END OF DAD).

R1010        THE MPACVBUF SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUF WITHOUT CLOBBERING MPAC.

1012                     7475  0 0006 1  MPACVBUF  EXTEND                   CALLED BY MXV, VXM, AND UNIT.
1013                     7476  3 0141 0            DCA     MPAC
1014                     7477  52 107 0            DXCH    VBUF
1015                     7500  0 0006 1            EXTEND
1016                     7501  3 0144 0            DCA     MPAC +3
1017                     7502  52 111 1            DXCH    VBUF +2
1018                     7503  0 0006 1            EXTEND
1019                     7504  3 0146 1            DCA     MPAC +5
1020                     7505  52 113 0            DXCH    VBUF +4
1021                     7506  0 0002 0            TC      Q                RETURN TO CALLER.
```

```
P1022          INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

 1024                        7507  0 7066 0  DMP1     TC       DMPSUB           DMP INSTRUCTION.
 1025                        7510  1 6014 0           TCF      DANZIG

 1026                        7511  0 7066 0  DMPR     TC       DMPSUB
 1027                        7512  0 7115 0           TC       ROUNDSUB
 1028                        7513  1 6014 0           TCF      DANZIG

 1029                        7514  0 0006 1  DDV      EXTEND
 1030                        7515  5 0102 1           INDEX    ADDRWD           MOVE DIVIDEND INTO BUF.
 1031                        7516  3 0001 0           DCA      0
 1032                        7517  1 7524 1           TCF      BDDV +4

 1033                        7520  0 0006 1  BDDV     EXTEND                    MOVE DIVISOR INTO MPAC SAVING MPAC, THE
 1034                        7521  5 0102 1           INDEX    ADDRWD           DIVIDEND, IN BUF.
 1035                        7522  3 0001 0           DCA      0
 1036                        7523  52 141 1           DXCH     MPAC
 1037                        7524  52 115 0   +4      DXCH     BUF
 1038                        7525  3 7653 0           CAF      ZERO             DIVIDE ROUTINES IN BANK 0.
 1039                        7526  54 004 1           TS       FBANK
 1040                        7527  1 2332 0           TCF      DDV/BDDV

 1041                        7530  3 0102 1  SETPD    CA       ADDRWD           ANYWHERE IN ERASABLE IN GENERAL, BUT
 1042                        7531  54 152 0           TS       PUSHLOC          ALMOST ALWAYS IN THE WORK AREA.
 1043                        7532  1 6014 0           TCF      DANZIG

 1044                        7533  3 7653 0  TSLC     CAF      ZERO             SHIFTING ROUTINES LOCATED IN BANK 00.
 1045                        7534  54 004 1           TS       FBANK
 1046                        7535  1 2153 0           TCF      TSLC2

 1047                        7536  3 6027 1  GSHIFT   CAF      LOW7             USED AS MASK AT GENSHIFT. THIS PROCESSES
 1048                        7537  54 004 1           TS       FBANK            ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH
 1049                        7540  1 2174 0           TCF      GENSHIFT         AN ADDRESS (ROUTINES IN BANK 0).
```

```
P1050           THE FOLLOWING IS THE PROLOGUE TO V/SC, IF THE PRESENT MODE IS VECTOR. IT SAVES THE SCALAR AT X IN BUF
R1052   AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING
R1054   THE SCALAR IN MPAC IN BUF BEFORE CALLING THE V/SC ROUTINE IN BANK 0.


 1055                          7541  10 147 1  V/SC      CCS     MODE
 1056                          7542  1 7553 1            TCF     DV/SC             MOVE VECTOR INTO MPAC.
 1057                          7543  1 7553 1            TCF     DV/SC

 1058                          7544  0 0006 1  VV/SC     EXTEND
 1059                          7545  5 0102 1            INDEX   ADDRWD
 1060                          7546  3 0001 0            DCA     0
 1061                          7547  52 115 0  V/SC1     DXCH    BUF               IN BOTH CASES. VECTOR IS NOW IN MPAC AND
 1062                          7550  3 7653 0            CAF     ZERO              SCALAR IN BUF.
 1063                          7551  54 004 1            TS      FBANK
 1064                          7552  1 2576 0            TCF     V/SC2

 1065                          7553  0 0006 1  DV/SC     EXTEND
 1066                          7554  5 0102 1            INDEX   ADDRWD
 1067                          7555  3 0003 1            DCA     2
 1068                          7556  52 144 1            DXCH    MPAC +3
 1069                          7557  0 0006 1            EXTEND
 1070                          7560  5 0102 1            INDEX   ADDRWD
 1071                          7561  3 0005 1            DCA     4
 1072                          7562  52 146 0            DXCH    MPAC +5

 1073                          7563  4 7646 0            CS      ONE               CHANGE MODE TO VECTOR.
 1074                          7564  54 147 1            TS      MODE

 1075                          7565  0 0006 1            EXTEND
 1076                          7566  5 0102 1            INDEX   ADDRWD
 1077                          7567  3 0001 0            DCA     0
 1078                          7570  52 141 1            DXCH    MPAC
 1079                          7571  1 7547 1            TCF     V/SC1             FINISH PROLOGUE AT COMMON SECTION.
```

```
P1080               SIGN AND COMPLEMENT INSTRUCTIONS.

 1081                        7572  50 102 1  SIGN      INDEX   ADDRWD          CALL COMP INSTRUCTION IF WORD AT X IS
 1082                        7573  10 000 0            CCS     0               NEGATIVE NON-ZERO.
 1083                        7574  1 6014 0            TCF     DANZIG
 1084                        7575  1 7577 1            TCF     +2
 1085                        7576  1 7605 1            TCF     COMP            DO THE COMPLEMENT.

 1086                        7577  50 102 1            INDEX   ADDRWD
 1087                        7600  10 001 1            CCS     1
 1088                        7601  1 6014 0            TCF     DANZIG
 1089                        7602  1 6014 0            TCF     DANZIG
 1090                        7603  1 7605 1            TCF     COMP
 1091                        7604  1 6014 0            TCF     DANZIG


 1092                        7605  0 0006 1  COMP      EXTEND                  COMPLEMENT DP MPAC IN EVERY CASE.
 1093                        7606  4 0141 1            DCS     MPAC
 1094                        7607  52 141 1            DXCH    MPAC

 1095                        7610  10 147 1            CCS     MODE            EITHER COMPLEMENT MPAC +3 OR THE REST OF
 1096                        7611  1 7622 1            TCF     DCOMP           THE VECTOR ACCUMULATOR.
 1097                        7612  1 7622 1            TCF     DCOMP

 1098                        7613  0 0006 1            EXTEND                  VECTOR COMPLEMENT.
 1099                        7614  4 0144 1            DCS     MPAC +3
 1100                        7615  52 144 1            DXCH    MPAC +3
 1101                        7616  0 0006 1            EXTEND
 1102                        7617  4 0146 0            DCS     MPAC +5
 1103                        7620  52 146 0            DXCH    MPAC +5
 1104                        7621  1 6014 0            TCF     DANZIG

 1105                        7622  4 0142 1  DCOMP     CS      MPAC +2
 1106                        7623  54 142 1            TS      MPAC +2
 1107                        7624  1 6014 0            TCF     DANZIG
```

```
P1108          CONSTANTS REQUIRED IN FIXED-FIXED.

 1109                     7625   37777 1  DPOSMAX  OCT     37777
 1110                     7626   37777 1  POSMAX   OCT     37777
 1111                     7627   57777 1  NEG1/2   OCT     -20000           MUST BE TWO LOCATIONS AHEAD OF POS1/2.

 1112                     7630   40000 0  BIT15    OCT     40000            BIT TABLE FOLLOWS.
 1113                     7631   20000 0  BIT14    OCT     20000
 1114                     7632   10000 0  BIT13    OCT     10000
 1115                     7633   04000 0  BIT12    OCT     04000
 1116                     7634   02000 0  BIT11    OCT     02000
 1117                     7635   01000 0  BIT10    OCT     01000
 1118                     7636   00400 0  BIT9     OCT     00400
 1119                     7637   00200 0  BIT8     OCT     00200
 1120                     7640   00100 0  BIT7     OCT     00100
 1121                     7641   00040 0  BIT6     OCT     00040
 1122                     7642   00020 0  BIT5     OCT     00020
 1123                     7643   00010 0  BIT4     OCT     00010
 1124                     7644   00004 0  BIT3     OCT     00004
 1125                     7645   00002 0  BIT2     OCT     00002
 1126                     7646   00001 0  BIT1     OCT     00001

 1127                             7630  NEGMAX   EQUALS  BIT15
 1128                             7631  HALF     EQUALS  BIT14
 1129                             7631  POS1/2   EQUALS  HALF
 1130                             7632  QUARTER  EQUALS  BIT13
 1131                             7634  2K       EQUALS  BIT11
 11311                    7647   00013 0  ELEVEN   DEC     11
 11312                            7647  NOUTCON  =       ELEVEN
 1132                     7650   00012 1  TEN      DEC     10
 11321                    7651   00011 1  NINE     DEC     9
 1133                             7643  EIGHT    EQUALS  BIT4
 1134                     7652   00007 0  SEVEN    OCT     7
 1135                             6162  SIX      EQUALS  REVCNT
 1136                             7644  FOUR     EQUALS  BIT3
 1137                             6165  THREE    EQUALS  NO.WDS +1
 1138                             7645  TWO      EQUALS  BIT2
 1139                             7646  ONE      EQUALS  BIT1
 1140                     7653   00000 1  ZERO     OCT     0
 1141                     7654   77777 0  NEGO     OCT     77777
 1142                     7655   77776 1  NEGONE   DEC     -1

 1143                             7655  NEG1     =       NEGONE
 1144                     7656   77775 1  NEG2     OCT     77775
 1145                             7652  LOW3     EQUALS  SEVEN
 1146                             6165  LOW2     EQUALS  THREE

 1147                     7657   00031 0  CALLCODE OCT     00031
 1148                     7660   40014 0  DLOADCOD OCT     40014
 1149                             7630  VLOADCOD EQUALS  BIT15
```

```
1150                     7661   40015 1  DLOAD*    OCT    40015
1151                              6042  VLOAD*    EQUALS OCT40001
1152                     7662   00106 0  LVBUF     ADRES  VBUF
```

```
SHIFTING AND ROUNDING PACKAGE.

          THE FOLLOWING SHORT SHIFT CODES REQUIRE NO ADDRESS WORD:

          1.  SR1 TO SR4          SCALAR SHIFT RIGHT.
          2.  SR1R TO SR4R        SCALAR SHIFT RIGHT AND ROUND.
          3.  SL1 TO SL4          SCALAR SHIFT LEFT.
          4.  SL1R TO SL4R        SCALAR SHIFT LEFT AND ROUND.

          5.  VSR1 TO VSR8        VECTOR SHIFT RIGHT (ALWAYS ROUNDS).
          6.  VSL1 TO VSL8        VECTOR SHIFT LEFT (NEVER ROUNDS).

          THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED:*

          1.  SR                  SCALAR SHIFT RIGHT.
          2.  SRR                 SCALAR SHIFT RIGHT AND ROUND.
          3.  SL                  SCALAR SHIFT LEFT.
          4.  SLR                 SCALAR SHIFT LEFT AND ROUND.

          5.  VSR                 VECTOR SHIFT RIGHT.
          6.  VSL                 VECTOR SHIFT LEFT.

*  IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE
ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.


                       00,2000                   SETLOC 10000             BANK 0 PORTION FOLLOWS.

             00,2000  3 6162 1   SHORTT    CAF      SIX               SCALAR SHORT SHIFTS COME HERE. THE SHIFT
             00,2001  7 0020 1             MASK     CYR               COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE
             00,2002  54 021 0             TS       SR                ROUNDING BIT IS IN BIT1 AT THIS POINT.

             00,2003  10 020 1             CCS      CYR               SEE IF RIGHT OR LEFT SHIFT DESIRED.
             00,2004  1 2062 0             TCF      TSSL              SHIFT LEFT.

             00,2005   00024 1   SRDDV     DEC      20                MPTEMP SETTING FOR SR BEFORE DDV.

             00,2006  50 021 1   TSSR      INDEX    SR                GET SHIFTING BIT.
             00,2007  3 7631 1             CAF      BIT14
             00,2010  54 121 1             TS       MPTEMP

             00,2011  10 020 1             CCS      CYR               SEE IF A ROUND IS DESIRED.
             00,2012  0 2031 1   RIGHTR    TC       MPACSRND          YES - SHIFT RIGHT AND ROUND.
             00,2013  1 6014 0             TCF      DANZIG
          00,2014  3 0121 0  MPACSHR   CA      MPTEMP      DO A TRIPLE PRECISION SHIFT RIGHT.
          00,2015  0 0006 1            EXTEND
          00,2016  7 0142 1            MP      MPAC +2
          00,2017  54 142 1   +3       TS      MPAC +2     (EXIT FROM SQRT AND ABVAL).
          00,2020  3 0121 0            CA      MPTEMP
          00,2021  0 0006 1            EXTEND
          00,2022  7 0140 0            MP      MPAC        SHIFT MAJOR PART INTO A,L AND PLACE IN
          00,2023  52 141 1            DXCH    MPAC        MPAC,+1.
          00,2024  3 0121 0            CA      MPTEMP
          00,2025  0 0006 1            EXTEND
          00,2026  7 0001 1            MP      L           ORIGINAL C(MPAC +1).
          00,2027  20 142 1            DAS     MPAC +1     GUARANTEED NO OVERFLOW.
          00,2030  1 6014 0            TCF     DANZIG

    MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

          00,2031  3 0142 0  MPACSRND  CA      MPAC +2     WE HAVE TO DO ALL THREE MULTIPLIES SINCE
          00,2032  0 0006 1            EXTEND              MPAC +1 AND MPAC +2 MIGHT HAVE SIGN
          00,2033  7 0121 1            MP      MPTEMP      DISAGREEMENT WITH A SHIFT RIGHT OF 1.
          00,2034  56 141 0            XCH     MPAC +1
          00,2035  0 0006 1            EXTEND
          00,2036  7 0121 1            MP      MPTEMP
          00,2037  56 141 0            XCH     MPAC +1     TRIAL MINOR PART.
          00,2040  6 0001 0            AD      L

          00,2041  6 0000 1  VSHR2     DOUBLE              (FINISH VECTOR COMPONENT SHIFT RIGHT
          00,2042  54 142 1            TS      MPAC +2     AND ROUND.
          00,2043  1 2045 0            TCF     +2
          00,2044  26 141 1            ADS     MPAC +1     GUARANTEED NO OVERFLOW.

          00,2045  3 7653 0            CAF     ZERO
          00,2046  54 142 1            TS      MPAC +2
          00,2047  56 140 1            XCH     MPAC        SETTING TO ZERO SO FOLLOWING DAS WORKS.
          00,2050  0 0006 1            EXTEND
          00,2051  7 0121 1            MP      MPTEMP
          00,2052  20 141 1            DAS     MPAC        AGAIN NO OVERFLOW.
          00,2053  0 0002 0            TC      Q

          00,2054  3 0121 0  VSHRRND   CA      MPTEMP      ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN
          00,2055  0 0006 1            EXTEND              MPAC CONTAINS A VECTOR COMPONENT.
          00,2056  7 0141 1            MP      MPAC +1
          00,2057  54 141 1            TS      MPAC +1
          00,2060  56 001 0            XCH     L
          00,2061  1 2041 1            TCF     VSHR2       GO ADD ONE IF NECESSARY AND FINISH.
```

```
P1223          ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

 1224                00,2062  3 0021 1  TSSL    CA      SR             GET SHIFT COUNT FOR SR.
 1225                00,2063 54 121  1   +1     TS      MPTEMP

 1226                00,2064  0 0006 1   +2     EXTEND                 ENTRY HERE FROM SL FOR SCALARS.
 1227                00,2065  3 0142 0          DCA     MPAC +1        SHIFTING LEFT ONE PLACE AT A TIME IS
 1228                00,2066 20 142  1          DAS     MPAC +1        FASTER THAN DOING THE WHOLE SHIFT WITH
 1229                00,2067  6 0140 1          AD      MPAC           MULTIPLIES ASSUMING THAT FREQUENCY OF
 1230                00,2070  6 0140 1          AD      MPAC           SHIFT COUNTS GOES DOWN RAPIDLY AS A
 1231                00,2071 54 140  0          TS      MPAC           FUNCTION OF THEIR MAGNITUDE.
 1232                00,2072  1 2074 1          TCF     +2
 1233                00,2073 54 105  1          TS      OVFIND         OVERFLOW. (LEAVES OVERFLOW-CORRECTED
A1234                                                                  RESULT ANYWAY).
 1235                00,2074 10 121  1          CCS     MPTEMP         LOOP ON DECREMENTED SHIFT COUNT.
 1236                00,2075  1 2063 1          TCF     TSSL +1

 1237                00,2076 10 020  1          CCS     CYR            SEE IF ROUND WANTED.
 1238                00,2077  0 7115 0          TC      ROUNDSUB       YES - ROUND AND EXIT.
 1239                00,2100  1 6014 0          TCF     DANZIG         SL LEAVES A ZERO IN CYR FOR NO ROUND.
 1240                00,2101  1 6014 0          TCF     DANZIG         NO - EXIT IMMEDIATL
```

```
      VECTOR SHIFTING ROUTINES.

                         00,2102   3 7652 1  SHORTV    CAF     LOW3          SAVE 3 BIT SHIFT COUNT - 1 WITHOUT
                         00,2103   7 0020 1            MASK    CYR           EDITING CYR.
                         00,2104  54 121 1             TS      MPTEMP
                         00,2105  10 020 1             CCS     CYR           SEE IF LEFT OR RIGHT SHIFT.
                         00,2106   1 2126 1            TCF     VSSL          VECTOR SHIFT LEFT.
                         00,2107    00176 1  OCT176    OCT     176           USED IN PROCESSED SHIFTS WITH - COUNT.

                         00,2110  50 121 0   VSSR      INDEX   MPTEMP        (ENTRY FROM SR). PICK UP SHIFTING BIT.
                         00,2111   3 7631 1            CAF     BIT14         MPTEMP CONTAINS THE SHIFT COUNT - 1.
                         00,2112  54 121 1             TS      MPTEMP
                         00,2113   0 2054 1            TC      VSHRRND       SHIFT X COMPONENT.

                         00,2114  52 141 1             DXCH    MPAC          SWAP X AND Y COMPONENTS.
                         00,2115  52 144 1             DXCH    MPAC +3
                         00,2116  52 141 1             DXCH    MPAC
                         00,2117   0 2054 1            TC      VSHRRND       SHIFT Y COMPONENT.

                         00,2120  52 141 1             DXCH    MPAC          SWAP Y AND Z COMPONENTS.
                         00,2121  52 146 0             DXCH    MPAC +5
                         00,2122  52 141 1             DXCH    MPAC
                         00,2123   0 2054 1            TC      VSHRRND       SHIFT Z COMPONENT.

                         00,2124   1 7364 0            TCF     VROTATEX      RESTORE COMPONENTS TO PROPER PLACES.
```

```
P1261   VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.

 1262                           00,2125  54 121 1   -1     TS      MPTEMP          SHIFTING LOOP.

 1263                           00,2126  0 0006 1  VSSL    EXTEND
 1264                           00,2127  3 0141 0          DCA     MPAC
 1265                           00,2130  20 141 1          DAS     MPAC
 1266                           00,2131  0 0006 1          EXTEND
 1267                           00,2132  1 2134 1          BZF     +2
 1268                           00,2133  0 7006 0          TC      OVERFLOW

 1269                           00,2134  0 0006 1          EXTEND
 1270                           00,2135  3 0144 0          DCA     MPAC +3
 1271                           00,2136  20 144 1          DAS     MPAC +3
 1272                           00,2137  0 0006 1          EXTEND
 1273                           00,2140  1 2142 0          BZF     +2
 1274                           00,2141  0 7006 0          TC      OVERFLOW

 1275                           00,2142  0 0006 1          EXTEND
 1276                           00,2143  3 0146 1          DCA     MPAC +5
 1277                           00,2144  20 146 0          DAS     MPAC +5
 1278                           00,2145  0 0006 1          EXTEND
 1279                           00,2146  1 2150 0          BZF     +2
 1280                           00,2147  0 7006 0          TC      OVERFLOW

 1281                           00,2150  10 121 1          CCS     MPTEMP          LOOP ON DECREMENTED SHIFT COUNTER.
 1282                           00,2151  1 2125 1          TCF     VSSL -1
 1283                           00,2152  1 6014 0          TCF     DANZIG          EXIT.
```

```
P1284           TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING
R1286     THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X.

 1287                      00,2153  54 121 1  TSLC2     TS       MPTEMP           START BY ZEROING SHIFT COUNT (IN A NOW).
 1288                      00,2154  0 6710 1            TC       BRANCH           EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
 1289                      00,2155  1 2157 1            TCF      +2
 1290                      00,2156  1 2172 0            TCF      ENDTSLC          STORES ZERO SHIFT COUNT IN THIS CASE.

 1291                      00,2157  3 0140 1            CA       MPAC             BEGIN NORMALIZATION LOOP.
 1292                      00,2160  1 2167 1            TCF      TSLCTEST

 1293                      00,2161  24 121 0  TSLCLOOP  INCR     MPTEMP           INCREMENT SHIFT COUNTER.
 1294                      00,2162  0 0006 1            EXTEND
 1295                      00,2163  3 0142 0            DCA      MPAC +1
 1296                      00,2164  20 142 1            DAS      MPAC +1
 1297                      00,2165  6 0140 1            AD       MPAC
 1298                      00,2166  26 140 0            ADS      MPAC
 1299                      00,2167  6 0000 1  TSLCTEST  DOUBLE                    SEE IF (ANOTHER) SHIFT IS REQUIRED.
 1300                      00,2170  54 000 0            OVSK
 1301                      00,2171  1 2161 1            TCF      TSLCLOOP         YES - INCREMENT COUNT AND SHIFT AGAIN.

 1302                      00,2172  4 0121 1  ENDTSLC   CS       MPTEMP
 1303                      00,2173  1 6626 1            TCF      STORE1           STORE SHIFT COUNT AND RETURN TO DANZIG.
```

```
P1304            THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.
R1306     THE GIVEN ADDRESS IS DECODED AS FOLLOWS:

R1307            BITS 1-7     SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.
R1308            BIT 8        PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).
R1310            BIT 9        0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.
R1311            BIT 10       1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.
R1312            BITS 11-15   0.

R1313     THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.


 1314                        00,2174  7 0102 0  GENSHIFT MASK    ADDRWD          GET SHIFT COUNT, TESTING FOR ZERO.
 1315                        00,2175  10 000 0           CCS     A               (ARRIVES WITH C(A) = LOW7).
 1316                        00,2176  1 2204 1           TCF     GENSHFT2        IF NON-ZERO, PROCEED WITH DECREMENTED CT

 1317                        00,2177  3 7635 0           CAF     BIT10           ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
 1318                        00,2200  7 0102 0           MASK    ADDRWD          WE MIGHT HAVE TO ROUND MPAC ON SLR AND
 1319                        00,2201  10 000 0           CCS     A               SRR (SCALAR ONLY).
 1320                        00,2202  0 7115 0           TC      ROUNDSUB
 1321                        00,2203  1 6014 0           TCF     DANZIG

 1322                        00,2204  54 121 1  GENSHFT2 TS      MPTEMP          DECREMENTED SHIFT COUNT TO MPTEMP.
 1323                        00,2205  3 7637 1           CAF     BIT8            TEST MEANING OF LOW SEVEN BIT COUNT IN
 1324                        00,2206  0 0006 1           EXTEND                  MPTEMP NOW.
 1325                        00,2207  7 0102 0           MP      ADDRWD
 1326                        00,2210  7 6165 1           MASK    LOW2            JUMPS ON SHIFT DIRECTION (BIT8) AND
 1327                        00,2211  50 000 1           INDEX   A
 1328                        00,2212  1 2213 1           TCF     +1              ORIGINAL SHIFT DIRECTION (BIT 9).
 1329                        00,2213  1 2312 1           TCF     RIGHT-          NEGATIVE SHIFT COUNT FOR SL OR SLR.
 1330                        00,2214  1 2321 1           TCF     LEFT            SL OR SLR.
 1331                        00,2215  1 2316 0           TCF     LEFT-           NEGATIVE SHIFT COUNT WITH SR OR SRR.
```

```
P1332          GENERAL SHIFT RIGHT.

 1333                    00,2216  10 147 1  RIGHT     CCS     MODE          SEE IF VECTOR OR SCALAR.
 1334                    00,2217  1 2257 1            TCF     GENSCR
 1335                    00,2220  1 2257 1            TCF     GENSCR

 1336                    00,2221  3 0121 0            CA      MPTEMP        SEE IF SHIFT COUNT GREATER THAN 13D.
 1337                    00,2222  6 2273 0  VRIGHT2   AD      NEG12
 1338                    00,2223  0 0006 1            EXTEND
 1339                    00,2224  6 2110 0            BZMF    VSSR          IF SO, BRANCH AND SHIFT IMMEDIATELY.

 1340                    00,2225  6 7655 0            AD      NEGONE        IF NOT, REDUCE MPTEMP BY A TOTAL OF 14,
 1341                    00,2226  54 121 1            TS      MPTEMP        AND DO A SHIFT RIGHT AND ROUND BY 14.
 1342                    00,2227  3 7653 0            CAF     ZERO          THE ROUND AT THIS STAGE MAY INTRODUCE A
 1343                    00,2230  54 001 1            TS      L             ONE BIT ERROR IN A SHIFT RIGHT 15D.
 1344                    00,2231  56 140 1            XCH     MPAC
 1345                    00,2232  56 141 0            XCH     MPAC +1
 1346                    00,2233  0 2252 0            TC      SETROUND      X COMPONENT NOW SHIFTED, SO MAKE UP THE
 1347                    00,2234  20 141 1            DAS     MPAC          ROUNDING QUANTITY (0 IN A AND 0 OR +-1
A1348                                                                       IN L).
 1349                    00,2235  56 143 1            XCH     MPAC +3       REPEAT THE ABOVE PROCESS FOR Y AND Z.
 1350                    00,2236  56 144 0            XCH     MPAC +4
 1351                    00,2237  0 2252 0            TC      SETROUND
 1352                    00,2240  20 144 1            DAS     MPAC +3       NO OVERFLOW ON THESE ADDS.

 1353                    00,2241  56 145 1            XCH     MPAC +5
 1354                    00,2242  56 146 1            XCH     MPAC +6
 1355                    00,2243  0 2252 0            TC      SETROUND
 1356                    00,2244  20 146 0            DAS     MPAC +5

 1357                    00,2245  10 121 1            CCS     MPTEMP        SEE IF DONE, DOING FINAL DECREMENT.
 1358                    00,2246  1 2222 0            TCF     VRIGHT2
 1359                    00,2247  1 3614 0  TCSUBTR   TCF     SUBTR
 1360                    00,2250   04604 1  BIASLO    DEC     .2974 B-1     SQRT CONSTANT

 1361                    00,2251  1 6014 0            TCF     DANZIG



 1362                    00,2252  6 0000 1  SETROUND  DOUBLE                MAKES UP ROUNDING QUANTITY FROM ARRIVING
 1363                    00,2253  54 142 1            TS      MPAC +2       C(A), L IS ZERO INITIALLY.
 1364                    00,2254  3 7653 0            CAF     ZERO
 1365                    00,2255  56 001 0            XCH     L
 1366                    00,2256  0 0002 0            TC      Q             RETURN AND DO THE DAS, RESETTING L TO 0.
```

```
                   PROCESS SR AND SRR FOR SCALARS.

                             00,2257  3 0121 0  GENSCR    CA      MPTEMP        SEE IF THE ORIGINAL SHIFT COUNT WAS LESS
                             00,2260  6 2273 0   +1       AD      NEG12         THAN 14D.
                             00,2261  0 0006 1            EXTEND
                             00,2262  6 2302 1            BZMF    DOSSHFT       DO THE SHIFT IMMEDIATELY IF SO.

                             00,2263  6 7655 0   +4       AD      NEGONE        IF NOT, DECREMENT SHIFT COUNT BY 14D AND
                             00,2264  54 121 1            TS      MPTEMP        SHIFT MPAC RIGHT 14 PLACES.
                             00,2265  3 7653 0            CAF     ZERO
                             00,2266  56 140 1            XCH     MPAC
                             00,2267  56 141 0            XCH     MPAC +1
                             00,2270  54 142 1            TS      MPAC +2
                             00,2271  10 121 1            CCS     MPTEMP        SEE IF FINISHED, DO FINAL DECREMENT.
                             00,2272  0 2260 1            TC      GENSCR +1
                             00,2273    77763 0  NEG12    DEC     -12
                             00,2274    22650 1  SLOPEHI  DEC     .5884         SQRT CONSTANT.
                             00,2275  3 7635 0            CAF     BIT10         FINISHED WITH SHIFT. SEE IF ROUND
                             00,2276  7 0102 0            MASK    ADDRWD        WANTED.
                             00,2277  10 000 0            CCS     A
                             00,2300  0 7115 0            TC      ROUNDSUB
                             00,2301  1 6014 0            TCF     DANZIG        DO SO AND/OR EXIT.

                             00,2302  50 121 0  DOSSHFT   INDEX   MPTEMP        PICK UP SHIFTING BIT.
                             00,2303  3 7631 1            CAF     BIT14
                             00,2304  54 121 1            TS      MPTEMP
                             00,2305  3 7635 0            CAF     BIT10         SEE IF TERMINAL ROUND DESIRED.
                             00,2306  7 0102 0            MASK    ADDRWD
                             00,2307  10 000 0            CCS     A
                             00,2310  1 2012 1            TCF     RIGHTR        YES.
                             00,2311  1 2014 1            TCF     MPACSHR       JUST SHIFT RIGHT.
```

```
P1395           PROCESS THE RIGHT- (SL(R) WITH A NEGATIVE COUNT), LEFT-, AND LEFT OPTIONS.

 1397                      00,2312   4 0121 1   RIGHT-     CS       MPTEMP             GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
 1398                      00,2313   6 2107 0              AD       OCT176             UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
 1399                      00,2314   54 121 1              TS       MPTEMP             WAS 1 INITIALLY.
 1400                      00,2315   1 2216 1              TCF      RIGHT              DO NORMAL SHIFT RIGHT.

 1401                      00,2316   4 0121 1   LEFT-      CS       MPTEMP             SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
 1402                      00,2317   6 2107 0              AD       OCT176             SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
 1403                      00,2320   54 121 1              TS       MPTEMP

 1404                      00,2321   10 147 1   LEFT       CCS      MODE               SINCE LEFT SHIFTING IS SONE ONE PLACE AT
 1405                      00,2322   1 2325 0              TCF      GENSCL             A TIME, NO COMPARISON WITH 14 NEED BE
 1406                      00,2323   1 2325 0              TCF      GENSCL             DONE. FOR SCALARS, SEE IF TERMINAL ROUND
 1407                      00,2324   1 2126 1              TCF      VSSL               DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.

 1408                      00,2325   3 7641 0   GENSCL     CAF      BIT6               PUT ROUNDING BIT (BIT10 OF ADDRWD) INTO
 1409                      00,2326   0 0006 1              EXTEND                      BIT 15 OF CYR WHERE THE ROUNDING BIT OF
 1410                      00,2327   7 0102 0              MP       ADDRWD             A SHORT SHIFT LEFT WOULD BE.
 1411                      00,2330   54 020 1              TS       CYR
 1412                      00,2331   1 2064 0              TCF      TSSL +2            DO THE SHIFT.
```

```
P1413           SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC
R1415     AND THE DIVISOR IN BUF.

 1416                      00,2332  4 7646 0  DDV/BDDV CS      ONE              INITIALIZATION.
 1417                      00,2333  54 122 1           TS      DVSIGN           +-1 FOR POSITIVE QUOTIENT - -0 FOR NEG.
 1418                      00,2334  54 123 0           TS      DVNORMCT         DIVIDEND NORMALIZATION COUNT.
 1419                      00,2335  54 124 1           TS      MAXDVSW          NEAR-ONE DIVIDE FLAG.

 1420                      00,2336  10 114 1           CCS     BUF              FORCE BUF POSITIVE WITH THE MAJOR PART
 1421                      00,2337  1 2366 1           TCF     BUF+             NON-ZERO.
 1422                      00,2340  1 2342 1           TCF     +2
 1423                      00,2341  1 2362 0           TCF     BUF-

 1424                      00,2342  56 115 1           XCH     BUF +1           SHIFT DIVIDEND AND DIVISOR LEFT 14.
 1425                      00,2343  56 114 0           XCH     BUF
 1426                      00,2344  56 141 0           XCH     MPAC +1
 1427                      00,2345  56 140 1           XCH     MPAC
 1428                      00,2346  0 0006 1           EXTEND                   CHECK FOR OVERFLOW.
 1429                      00,2347  1 2351 0           BZF     +2
 1430                      00,2350  1 2355 1           TCF     DVOVF

 1431                      00,2351  10 114 1           CCS     BUF              TRY AGAIN ON FORMER MINOR PART.
 1432                      00,2352  1 2366 1           TCF     BUF+
 1433                      00,2353  1 2355 1           TCF     DVOVF            OVERFLOW ON ZERO DIVISOR.
 1434                      00,2354  1 2362 0           TCF     BUF-

 1435                      00,2355  3 7626 1  DVOVF    CAF     POSMAX           ON DIVISION OVERFLOW OF ANY SORT, SET
 1436                      00,2356  54 140 0           TS      MPAC             SET DP MPAC TO +-POSMAX.
 1437                      00,2357  0 2552 1           TC      FINALDV +3
 1438                      00,2360  3 7646 1           CAF     ONE              SET OVERFLOW INDICATOR AND EXIT.
 1439                      00,2361  1 7060 1           TCF     SETOVF

 1440                      00,2362  0 0006 1  BUF-     EXTEND                   IF BUF IS NEGATIVE, COMPLEMENT IT AND
 1441                      00,2363  4 0115 0           DCS     BUF              MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.
 1442                      00,2364  52 115 0           DXCH    BUF
 1443                      00,2365  24 122 0           INCR    DVSIGN           NOW -0.

 1444                      00,2366  10 140 0  BUF+     CCS     MPAC             FORCE MPAC POSITIVE, CHECKING FOR ZERO
 1445                      00,2367  1 2403 0           TCF     MPAC+            DIVIDEND IN THE PROCESS.
 1446                      00,2370  1 2372 1           TCF     +2
 1447                      00,2371  1 2377 1           TCF     MPAC-
 1448                      00,2372  10 141 1           CCS     MPAC +1
 1449                      00,2373  1 2403 0           TCF     MPAC+
 1450                      00,2374  1 6014 0           TCF     DANZIG           EXIT IMMEDIATELY ON ZERO DIVIDEND.
 1451                      00,2375  1 2377 1           TCF     MPAC-
 1452                      00,2376  1 6014 0           TCF     DANZIG

 1453                      00,2377  0 0006 1  MPAC-    EXTEND                   FORCE MPAC POSITIVE AS BUF IN BUF-.
 1454                      00,2400  4 0141 1           DCS     MPAC
 1455                      00,2401  52 141 1           DXCH    MPAC
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1456                    00,2402  24 122 0           INCR    DVSIGN          NOW +1 OR -0.
```

```
1457        00,2403   4 0140 0  MPAC+     CS      MPAC          CHECK FOR DIVISION OVERFLOW. IF THE
1458        00,2404   6 7655 0            AD      NEGONE        MAJOR PART OF THE DIVIDEND IS LESS THAN
1459        00,2405   6 0114 0            AD      BUF           THE MAJOR PART OF THE DIVISOR BY AT
1460        00,2406  10 000 0             CCS     A             LEAST TWO, WE CAN PROCEED IMMEDIATELY
1461        00,2407   1 2451 1            TCF     DVNORM        WITHOUT NORMALIZATION PRODUCING A DVMAX.
1462        00,2410    60001 0  -1/2+2    OCT     60001         USED IN SQRTSUB.

1463        00,2411   1 2412 0            TCF     +1            IF THE ABOVE DOES NOT HOLD, FORCE SIGN
1464        00,2412   3 7631 1            CAF     HALF          AGREEMENT IN NUMERATOR AND DENOMINATOR
1465        00,2413   6 0000 1            DOUBLE                TO FACILITATE OVERFLOW AND NEAR-ONE
1466        00,2414   6 0141 0            AD      MPAC +1       CHECKING.
1467        00,2415  54 141 1             TS      MPAC +1
1468        00,2416   3 7653 0            CAF     ZERO
1469        00,2417   6 7626 1            AD      POSMAX
1470        00,2420  26 140 0             ADS     MPAC

1471        00,2421   3 7631 1            CAF     HALF          SAME FOR BUF.
1472        00,2422   6 0000 1            DOUBLE
1473        00,2423   6 0115 1            AD      BUF +1
1474        00,2424  54 115 0             TS      BUF +1
1475        00,2425   3 7653 0            CAF     ZERO
1476        00,2426   6 7626 1            AD      POSMAX
1477        00,2427  26 114 1             ADS     BUF

1478        00,2430   4 0140 0            CS      MPAC          CHECK MAGNITUDE OF SIGN-CORRECTED
1479        00,2431   6 0114 0            AD      BUF           OPERANDS.
1480        00,2432  10 000 0             CCS     A
1481        00,2433   1 2451 1            TCF     DVNORM        DIVIDE OK - WILL NOT BECOME MAXDV CASE.
1482        00,2434    00117 0  LBUF2     ADRES   BUF2
1483        00,2435   1 2355 1            TCF     DVOVF         DIVISOR NOT LESS THAN DIVIDEND - OVF.

1484        00,2436  54 124 1             TS      MAXDVSW       IF THE MAJOR PARTS OF THE DIVIDEND AND
1485        00,2437   4 0141 1            CS      MPAC +1       DIVISOR ARE EQUAL, A SPECIAL APPROXIMA-
1486        00,2440   6 0115 1            AD      BUF +1        TION IS USED (PROVIDED THE DIVISION IS
1487        00,2441   0 0006 1            EXTEND                POSSIBLE, OF COURSE).
1488        00,2442   6 2355 0            BZMF    DVOVF
1489        00,2443   1 2451 1            TCF     DVNORM        IF NO OVERFLOW.
```

```
00,2444  0 0006 1  BUFNORM  EXTEND                ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
00,2445  24 123 1           AUG     DVNORMCT      LEFT ONE PLACE.
00,2446  0 0006 1           EXTEND
00,2447  3 0115 1           DCA     BUF
00,2450  20 115 0           DAS     BUF

00,2451  3 0114 0  DVNORM   CA      BUF           SEE IF DIVISOR NORMALIZED YET.
00,2452  6 0000 1           DOUBLE
00,2453  54 000 0           OVSK
00,2454  1 2444 0           TCF     BUFNORM       NO - SHIFT LEFT ONE AND TRY AGAIN.

00,2455  52 141 1           DXCH    MPAC          CALL DIVIDEND NORMALIZATION SEQUENCE
00,2456  50 123 1           INDEX   DVNORMCT      PRIOR TO DOING THE DIVIDE.
00,2457  0 2507 1           TC      MAXTEST

00,2460  54 142 1           TS      MPAC +2       RETURNS WITH DIVISION DONE AND C(A) = 0.
00,2461  1 6014 0           TCF     DANZIG
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P1504         THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

 1506                   00,2462  22 021 1    -21D     LXCH    SR                SPECIAL PROLOGUE FOR UNIT WHEN THE
 1507                   00,2463  0 0006 1             EXTEND                    LENGTH OF THE ARGUMENT WAS NOT LESS THAN
 1508                   00,2464  7 7631 0             MP      HALF              .5. IN THIS CASE, EACH COMPONENT MUST BE
 1509                   00,2465  56 001 0             XCH     L                 SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT
 1510                   00,2466  6 0021 1             AD      SR                VECTOR.
 1511                   00,2467  56 001 0             XCH     L
 1512                   00,2470  1 2513 0             TCF     GENDDV +1         WITH DP DIVIDEND IN A,L.

 1513                   00,2471  20 001 1             DDOUBL                    PROLOGUE WHICH NORMALIZES THE DIVIDEND
 1514                   00,2472  20 001 1             DDOUBL                    WHEN IT IS KNOWN THAT NO DIVISION
 1515                   00,2473  20 001 1             DDOUBL                    OVERFLOW WILL OCCUR.
 1516                   00,2474  20 001 1             DDOUBL
 1517                   00,2475  20 001 1             DDOUBL
 1518                   00,2476  20 001 1             DDOUBL
 1519                   00,2477  20 001 1             DDOUBL
 1520                   00,2500  20 001 1             DDOUBL
 1521                   00,2501  20 001 1             DDOUBL
 1522                   00,2502  20 001 1             DDOUBL
 1523                   00,2503  20 001 1             DDOUBL
 1524                   00,2504  20 001 1             DDOUBL
 1525                   00,2505  20 001 1             DDOUBL
 1526                   00,2506  52 141 1             DXCH    MPAC

 1527                   00,2507  10 124 1   MAXTEST   CCS     MAXDVSW           0 IF MAJORS MIGHT BE =, -1 OTHERWISE.
 1528                   00,2510   06552 0   BIASHI    DEC     .4192 B-1         SQRT CONSTANTS

 1529                   00,2511  1 2564 0             TCF     MAXDV             CHECK TO SEE IF THEY ARE NOW EQUAL.
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R1530          THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES
R1532    THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED:

R1533          1.  THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R1534          2.  THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF
R1536    (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R1538          UNDERSTANDING THAT A/B = Q + S(R/B) WHERE S = 2(-14) AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-
R1540    TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY C - SD AND NEGLECTING TERMS OF
R1542    ORDER S-SQUARED (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R1544          A + SB .     (R - QD)                                                   A + SB
R1546          ------ = Q + S(------) WHERE Q AND R ARE QUOTIENT AND REMAINDER OF ------ RESPECTIVELY.
R1548          C + SD       (  C   )                                                     C


 1550                  00,2512  52 141 1  GENDDV   DXCH    MPAC          WE NEED A AND B ONLY FOR FIRST DV.
 1551                  00,2513  0 0006 1   +1      EXTEND                (SPECIAL UNIT PROLOGUE ENTERS HERE).
 1552                  00,2514  10 114 1           DV      BUF           A NOW CONTAINS Q AND L. R.
 1553                  00,2515  52 141 1           DXCH    MPAC

 1554                  00,2516  4 0140 0           CS      MPAC          FORM DIVIDEND FOR MINOR PART OF RESULT.
 1555                  00,2517  0 0006 1           EXTEND
 1556                  00,2520  7 0115 0           MP      BUF +1
 1557                  00,2521  6 0141 0           AD      MPAC +1       OVERFLOW AT THIS POINT IS POSITIVE SINCE
 1558                  00,2522  54 000 0           OVSK                  R IS POSITIVE IN EVERY CASE.
 1559                  00,2523  1 2530 1           TCF     +5

 1560                  00,2524  0 0006 1           EXTEND                OVERFLOW CAN BE REMOVED BY SUBTRACTING C
 1561                  00,2525  60 114 0           SU      BUF           (BUF) ONCE SINCE R IS ALWAYS LESS THAN C
 1562                  00,2526  24 140 1           INCR    MPAC          IN THIS CASE. INCR COMPENSATES SUBTRACT.
 1563                  00,2527  1 2532 0           TCF     +DOWN         (SINCE C(A) IS STILL POSITIVE).

 1564                  00,2530  0 0006 1   +5      EXTEND                C(A) CAN BE MADE LESS THAN C IN MAGNI-
 1565                  00,2531  6 2542 0           BZMF    -UP           TUDE BY DIMINISHING IT BY C (SINCE C IS
A1566                                                                    NOT LESS THAN .5) UNLESS C(A) = 0.
```

```
00,2532  0 0006 1  +DOWN     EXTEND
00,2533  60 114 0            SU      BUF              IF POSITIVE, REDUCE ONLY IF NECESSARY
00,2534  0 0006 1            EXTEND                   SINCE THE COMPENSATING INCR MIGHT CAUSE
00,2535  1 2540 0            BZF     +3               OVERFLOW.
00,2536  0 0006 1            EXTEND                   DONT SUBTRACT UNLESS RESULT IS POSITIVE
00,2537  6 2546 1            BZMF    ENDMAXDV         OR ZERO.

00,2540  24 140 1   +3       INCR    MPAC             KEEP SUBTRACT HERE AND COMPENSATE.
00,2541  1 2547 1            TCF     FINALDV

00,2542  0 0006 1  -UP       EXTEND                   IF ZERO, SET MINOR PART OF RESULT TO
00,2543  1 2552 0            BZF     FINALDV +3       ZERO.

00,2544  0 0006 1            EXTEND                   IF NEGATIVE, ADD C TO A, SUBTRACTING ONE
00,2545  26 140 0            DIM     MPAC             TO COMPENSATE. DIM IS OK HERE SINCE THE
00,2546  6 0114 0  ENDMAXDV  AD      BUF              MAJOR PART NEVER GOES NEGATIVE.
```

```
00,2547  22 007 0  FINALDV  ZL                DO DV TO OBTAIN MINOR PART OF RESULT.
00,2550  0 0006 1           EXTEND
00,2551  10 114 1           DV      BUF
00,2552  54 141 1   +3      TS      MPAC +1

00,2553  10 122 1           CCS     DVSIGN    LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
00,2554  0 0002 0           TC      Q         -0.
00,2555  0 0002 0           TC      Q
00,2556  0 0002 0           TC      Q

00,2557  0 0006 1           EXTEND
00,2560  4 0141 1           DCS     MPAC
00,2561  52 141 1           DXCH    MPAC
00,2562  3 7653 0           CAF     ZERO      SO WE ALWAYS RETURN WITH C(A) = 0.
00,2563  0 0002 0           TC      Q
```

```
P1593             IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE
R1595      DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS
R1597      ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, & D POSITIVE).

R1599                      C + SB .          (C + B - D)
R1600                      ------ = 37777 + S(---------)
R1601                      C + SD            (    C    )

R1602             THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.


 1604                         00,2564  4 0140 0  MAXDV    CS      MPAC           SEE IF MAXDV CASE STILL HOLDS AFTER
 1605                         00,2565  6 0114 0           AD      BUF            NORMALIZATION.
 1606                         00,2566  0 0006 1           EXTEND
 1607                         00,2567  1 2571 1           BZF     +2
 1608                         00,2570  1 2512 1           TCF     GENDDV         MPAC NOW LESS THAN BUF - DIVIDE AS USUAL

 1609                         00,2571  3 7626 1    +2     CAF     POSMAX         SET MAJOR PART OF RESULT.
 1610                         00,2572  54 140 0           TS      MPAC

 1611                         00,2573  4 0115 0           CS      BUF +1         FORM DIVIDEND OF MINOR PART OF RESULT.
 1612                         00,2574  6 0141 0           AD      MPAC +1
 1613                         00,2575  1 2546 0           TCF     ENDMAXDV       GO ADD C AND DO DIVIDE, ATTACHING SIGN
A1614                                                                            BEFORE EXITING.
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```
          VECTOR DIVIDED BY SCALAR, V/SC, IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUF.

          00,2576  4 7646 0  V/SC2    CS     ONE           INITIALIZE DIVIDEND NORMALIZATION COUNT
          00,2577  54 123 0           TS     DVNORMCT      AND DIVISION SIGN REGISTER.
          00,2600  54 113 0           TS     VBUF +5

          00,2601  10 114 1           CCS    BUF           FORCE DIVISOR POSITIVE WITH MAJOR PART
          00,2602  1 2637 0           TCF    /BUF+         NON-ZERO (IF POSSIBLE).
          00,2603  1 2605 1           TCF    +2
          00,2604  1 2633 1           TCF    /BUF-

          00,2605  56 115 1           XCH    BUF +1        SHIFT VECTOR AND SCALAR LEFT 14.
          00,2606  56 114 0           XCH    BUF
          00,2607  56 141 0           XCH    MPAC +1
          00,2610  56 140 1           XCH    MPAC
          00,2611  0 0006 1           EXTEND               CHECK FOR OVERFLOW IN EACH CASE.
          00,2612  1 2614 1           BZF    +2
          00,2613  1 2355 1           TCF    DVOVF

          00,2614  56 144 0           XCH    MPAC +4
          00,2615  56 143 1           XCH    MPAC +3
          00,2616  0 0006 1           EXTEND
          00,2617  1 2621 1           BZF    +2
          00,2620  1 2355 1           TCF    DVOVF

          00,2621  56 146 1           XCH    MPAC +6
          00,2622  56 145 1           XCH    MPAC +5
          00,2623  0 0006 1           EXTEND
          00,2624  1 2626 0           BZF    +2
          00,2625  1 2355 1           TCF    DVOVF

          00,2626  10 114 1           CCS    BUF
          00,2627  1 2637 0           TCF    /BUF+
          00,2630  1 2355 1           TCF    DVOVF         ZERO DIVISOR - OVERFLOW.
          00,2631  1 2633 1           TCF    /BUF-
          00,2632  1 2355 1           TCF    DVOVF

          00,2633  0 0006 1  /BUF-    EXTEND               ON NEGATIVE, COMPLEMENT BUF AND MAINTAIN
          00,2634  4 0115 0           DCS    BUF           DVSIGN IN VBUF +5.
          00,2635  52 115 0           DXCH   BUF
          00,2636  24 113 1           INCR   VBUF +5
```

```
00,2637   3 7631 1  /BUF+     CAF     HALF              FORCE SIGN AGREEMENT IN DIVISOR.
00,2640   6 0000 1            DOUBLE
00,2641   6 0115 1            AD      BUF +1
00,2642  54 115 0             TS      BUF +1
00,2643   3 7653 0            CAF     ZERO
00,2644   6 7626 1            AD      POSMAX
00,2645  26 114 1             ADS     BUF

00,2646  56 117 0             XCH     BUF2              LEAVE ABS(ORIGINAL DIVISOR) IN BUF2 FOR
00,2647   3 0115 1            CA      BUF +1            OVERFLOW TESTING.
00,2650  54 120 0             TS      BUF2 +1
00,2651   1 2657 0            TCF     /NORM             NORMALIZE DIVISOR IN BUF.

00,2652   0 0006 1  /NORM2    EXTEND                    IF LESS THAN .5, AUGMENT DVNORMCT AND
00,2653  24 123 1             AUG     DVNORMCT          DOUBLE DIVISOR.
00,2654   0 0006 1            EXTEND
00,2655   3 0115 1            DCA     BUF
00,2656  20 115 0             DAS     BUF

00,2657   3 0114 0  /NORM     CA      BUF               SEE IF DIVISOR NORMALIZED.
00,2660   6 0000 1            DOUBLE
00,2661  54 000 0             OVSK
00,2662   1 2652 0            TCF     /NORM2            DOUBLE AND TRY AGAIN IF NOT.

00,2663   0 2675 1            TC      V/SCDV            DO X COMPONENT DIVIDE.
00,2664  52 144 1             DXCH    MPAC +3           SUPPLY ARGUMENTS IN USUAL SEQUENCE.
00,2665  52 141 1             DXCH    MPAC
00,2666  52 144 1             DXCH    MPAC +3

00,2667   0 2675 1            TC      V/SCDV            Y COMPONENT.
00,2670  52 146 0             DXCH    MPAC +5
00,2671  52 141 1             DXCH    MPAC
00,2672  52 146 0             DXCH    MPAC +5

00,2673   0 2675 1            TC      V/SCDV            Z COMPONENT.
00,2674   1 7364 0            TCF     VROTATEX          GO RE-ARRANGE COMPONENTS BEFORE EXIT.
```

```
P1680              SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC,+1 BY THE SCALAR GIVEN IN BUF.

 1682                             00,2675  3 0113 1  V/SCDV    CA      VBUF +5           REFLECTS SIGN OF SCALAR.
 1683                             00,2676  54 122 1            TS      DVSIGN

 1684                             00,2677  10 140 0            CCS     MPAC              FORCE MPAC POSITIVE, EXITING ON ZERO.
 1685                             00,2700  1 2714 0            TCF     /MPAC+
 1686                             00,2701  1 2703 0            TCF     +2
 1687                             00,2702  1 2710 1            TCF     /MPAC-

 1688                             00,2703  10 141 1            CCS     MPAC +1
 1689                             00,2704  1 2714 0            TCF     /MPAC+
 1690                             00,2705  0 0002 0            TC      Q
 1691                             00,2706  1 2710 1            TCF     /MPAC-
 1692                             00,2707  0 0002 0            TC      Q

 1693                             00,2710  0 0006 1  /MPAC-    EXTEND                    USUAL COMPLEMENTING AND SETTING OF SIGN.
 1694                             00,2711  4 0141 1            DCS     MPAC
 1695                             00,2712  52 141 1            DXCH    MPAC
 1696                             00,2713  24 122 0            INCR    DVSIGN

 1697                             00,2714  4 7646 0  /MPAC+    CS      ONE               INITIALIZE NEAR-ONE SWITCH.
 1698                             00,2715  54 124 1            TS      MAXDVSW

 1699                             00,2716  4 0140 0            CS      MPAC              CHECK POSSIBLE OVERFLOW.
 1700                             00,2717  6 0117 0            AD      BUF2              UNNORMALIZED INPUT DIVISOR.
 1701                             00,2720  0 0006 1            EXTEND
 1702                             00,2721  6 2725 0            BZMF    /AGREE            CHECK FOR NEAR-ONE OR OVERFLOW.

 1703                             00,2722  52 141 1  DDVCALL   DXCH    MPAC              CALL PRE-DIVIDE NORMALIZATION.
 1704                             00,2723  50 123 1            INDEX   DVNORMCT
 1705                             00,2724  1 2507 0            TCF     MAXTEST
```

```
00,2725   3 7631 1   /AGREE    CAF     HALF           FORCE SIGN AGREEMENT IN DIVIDEND
00,2726   6 0000 1             DOUBLE                 (ALREADY DONE FOR DIVISOR).
00,2727   6 0141 0             AD      MPAC +1
00,2730  54 141 1              TS      MPAC +1
00,2731   3 7653 0             CAF     ZERO
00,2732   6 7626 1             AD      POSMAX
00,2733  26 140 0              ADS     MPAC

00,2734   4 0140 0             CS      MPAC           CHECK TO SEE IF OVERFLOW GONE OR IF
00,2735   6 0117 0             AD      BUF2           NEAR-ONE CASE IS PRESENT.
00,2736  10 000 0              CCS     A
00,2737   1 2722 0             TCF     DDVCALL        NOT NEAR-ONE.
00,2740    32506 0   SLOPELO   DEC     .8324
00,2741   1 2355 1             TCF     DVOVF          NO HOPE.

00,2742  54 124 1              TS      MAXDVSW        SIGNAL POSSIBLE NEAR-ONE CASE.
00,2743   4 0141 1             CS      MPAC +1        SEE IF DIVISION CAN BE DONE.
00,2744   6 0120 1             AD      BUF2 +1
00,2745   0 0006 1             EXTEND
00,2746   6 2355 0             BZMF    DVOVF
00,2747   1 2722 0             TCF     DDVCALL        GOING TO MAXDV.
```

```
P1725               THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

 1727                         00,2750  0 7475 0  UNIT      TC       MPACVBUF          SAVE THE ARGUMENT IN VBUF.
 1728                         00,2751  0 3236 0            TC       VSQSUB            DOT MPAC WITH ITSELF.
 1729                         00,2752  0 0006 1            EXTEND
 1730                         00,2753  3 0141 0            DCA      MPAC              LEAVE THE SQUARE OF THE LENGTH OF THE
 1731                         00,2754  50 104 1            INDEX    FIXLOC            ARGUMENT IN LVSQUARE.
 1732                         00,2755  52 043 1            DXCH     LVSQUARE

 1733                         00,2756  0 3262 1            TC       SQRTSUB           GO TAKE THE NORMALIZED SQUARE ROOT.

 1734                         00,2757  10 140 0            CCS      MPAC              CHECK FOR UNIT OVERFLOW.
 1735                         00,2760  1 2762 1            TCF      +2                MPAC IS NOT LESS THAN .5 UNLESS THE
 1736                         00,2761  1 2355 1            TCF      DVOVF             INPUT TO SQRTSUB WAS 0.

 1737                         00,2762  4 3063 0            CS       FOURTEEN          SEE IF THE INPUT WAS SO SMALL THE THE
 1738                         00,2763  6 0121 0            AD       MPTEMP            FIRST TWO REGISTERS OF THE SQUARE WERE 0
 1739                         00,2764  10 000 0            CCS      A
 1740                         00,2765  4 0000 0            COM                        IF SO, SAVE THE NEGATIVE OF THE SHIFT
 1741                         00,2766  1 3044 0            TCF      SMALL             COUNT -15D.

 1742                         00,2767  1 2776 1            TCF      LARGE             (THIS IS USUALLY THE CASE.)

 1743                         00,2770  4 3062 1            CS       THIRTEEN          IF THE SHIFT COUNT WAS EXACTLY 14, SET
 1744                         00,2771  54 121 1            TS       MPTEMP            THE PRE-DIVIDE NORM COUNT TO -13D.

 1745                         00,2772  3 0140 1            CA       MPAC              SHIFT THE LENGTH RIGHT 14 BEFORE STORING
 1746                         00,2773  54 001 1  SMALL2    TS       L                 (SMALL EXITS TO THIS POINT).
 1747                         00,2774  3 7653 0            CAF      ZERO
 1748                         00,2775  1 3023 1            TCF      LARGE2            GO TO STORE LENGTH AND PROCEED.

 1749                         00,2776  10 121 1  LARGE     CCS      MPTEMP            MOST ALL CASES COME HERE.
 1750                         00,2777  1 3005 0            TCF      LARGE3            SEE IF NO NORMALIZATION WAS REQUIRED BY

 1751                         00,3000  4 2005 1            CS       SRDDV             SQRT, AND IF SO, SET UP FOR A SHIFT
 1752                         00,3001  54 121 1            TS       MPTEMP            RIGHT 1 BEFORE DIVIDING TO PRODUCE
 1753                         00,3002  0 0006 1            EXTEND                     THE DESIRED HALF UNIT VECTOR.
 1754                         00,3003  3 0141 0            DCA      MPAC
 1755                         00,3004  1 3023 1            TCF      LARGE2
```

```
00,3005  4 0000 0  LARGE3  COM                   LEAVE NEGATIVE OF SHIFT COUNT-1 FOR
00,3006  54 121 1          TS      MPTEMP        PREDIVIDE LEFT SHIFT.

00,3007  4 0000 0          COM                   PICK UP REQUIRED SHIFTING BIT TO UNNORM-
00,3010  50 000 1          INDEX   A             ALIZE THE SQRT RESULT.
00,3011  3 7631 1          CAF     BIT14
00,3012  54 114 1          TS      BUF
00,3013  0 0006 1          EXTEND
00,3014  7 0141 1          MP      MPAC +1
00,3015  56 114 0          XCH     BUF
00,3016  0 0006 1          EXTEND                (UNNORMALIZE THE SQRT FOR LV).
00,3017  7 0140 0          MP      MPAC
00,3020  56 001 0          XCH     L
00,3021  6 0114 0          AD      BUF
00,3022  56 001 0          XCH     L

00,3023  50 104 1  LARGE2  INDEX   FIXLOC
00,3024  52 045 1          DXCH    LV            LENGTH NOW STORED IN WORK AREA.

00,3025  4 7646 0          CS      ONE
00,3026  54 124 1          TS      MAXDVSW       NO MAXDV CASES IN UNIT.

00,3027  52 107 0          DXCH    VBUF          PREPARE X COMPONENT FOR DIVIDE, SETTING
00,3030  52 141 1          DXCH    MPAC          LENGTH OF VECTOR AS DIVISOR IN BUF.
00,3031  52 115 0          DXCH    BUF
00,3032  0 3064 0          TC      UNITDV

00,3033  52 111 1          DXCH    VBUF +2       DO Y AND Z IN USUAL FASHION SO WE CAN
00,3034  52 141 1          DXCH    MPAC          EXIT THROUGH VROTATEX.
00,3035  52 144 1          DXCH    MPAC +3
00,3036  0 3064 0          TC      UNITDV

00,3037  52 113 0          DXCH    VBUF +4
00,3040  52 141 1          DXCH    MPAC
00,3041  52 146 0          DXCH    MPAC +5
00,3042  0 3064 0          TC      UNITDV
00,3043  1 7364 0          TCF     VROTATEX      AND EXIT.
```

```
P1787              IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST
R1789        14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.

 1791                       00,3044  54 121 1  SMALL     TS      MPTEMP          NEGATIVE OF PRE-DIVIDE SHIFT COUNT.

 1792                       00,3045  3 7653 0            CAF     ZERO            SHIFT EACH COMPONENT LEFT 14.
 1793                       00,3046  56 107 1            XCH     VBUF +1
 1794                       00,3047  56 106 0            XCH     VBUF
 1795                       00,3050  56 111 0            XCH     VBUF +3
 1796                       00,3051  56 110 1            XCH     VBUF +2
 1797                       00,3052  56 113 1            XCH     VBUF +5
 1798                       00,3053  56 112 0            XCH     VBUF +4

 1799                       00,3054  4 0121 1            CS      MPTEMP
 1800                       00,3055  50 000 1            INDEX   A
 1801                       00,3056  3 7631 1            CAF     BIT14
 1802                       00,3057  0 0006 1            EXTEND
 1803                       00,3060  7 0140 0            MP      MPAC
 1804                       00,3061  1 2773 1            TCF     SMALL2

 1805                       00,3062   00015 0  THIRTEEN  DEC     13
 1806                       00,3063   00016 0  FOURTEEN  DEC     14
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P1807            THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

 1808                       00,3064  10 140 0  UNITDV   CCS     MPAC            FORCE MPAC POSITIVE IF POSSIBLE, SETTING
 1809                       00,3065  1 3103 1           TCF     UMPAC+          DVSIGN ACCORDING TO THE SIGN OF MPAC
 1810                       00,3066  1 3070 1           TCF     +2              SINCE THE DIVISOR IS ALWAYS POSITIVE
 1811                       00,3067  1 3075 1           TCF     UMPAC-          HERE.

 1812                       00,3070  10 141 1           CCS     MPAC +1
 1813                       00,3071  1 3103 1           TCF     UMPAC+
 1814                       00,3072  0 0002 0           TC      Q               EXIT IMMEDIATELY ON ZERO.
 1815                       00,3073  1 3075 1           TCF     UMPAC-
 1816                       00,3074  0 0002 0           TC      Q

 1817                       00,3075  4 7653 1  UMPAC-   CS      ZERO            IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL
 1818                       00,3076  54 122 1           TS      DVSIGN          COMPLEMENT.
 1819                       00,3077  0 0006 1           EXTEND
 1820                       00,3100  4 0141 1           DCS     MPAC            PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
 1821                       00,3101  50 121 0           INDEX   MPTEMP
 1822                       00,3102  1 2507 0           TCF     MAXTEST

 1823                       00,3103  54 122 1  UMPAC+   TS      DVSIGN          SET DVSIGN FOR POSITIVE QUOTIENT.
 1824                       00,3104  52 141 1           DXCH    MPAC
 1825                       00,3105  50 121 0           INDEX   MPTEMP
 1826                       00,3106  1 2507 0           TCF     MAXTEST
```

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P1827              MISCELLANEOUS UNARY OPERATIONS.

 1828                         00,3107  0 3217 0  DSQ       TC       DSQSUB        SQUARE THE DP CONTENTS OF MPAC.
 1829                         00,3110  1 6014 0            TCF      DANZIG

 1830                         00,3111  0 7115 0  ROUND     TC       ROUNDSUB      ROUNDS MPAC TO DOUBLE PRECISION.
 1831                         00,3112  3 7653 0            CAF      ZERO          FORCE DP MODE.
 1832                         00,3113  1 6013 1            TCF      NEWMODE

 1833                         00,3114  10 147 1  ABVALABS  CCS      MODE          ABVAL OR ABS INSTRUCTION.
 1834                         00,3115  1 3144 1            TCF      ABS           DO ABS ON SCALAR.
 1835                         00,3116  1 3144 1            TCF      ABS

 1836                         00,3117  0 3236 0  ABVAL     TC       VSQSUB        DOT MPAC WITH ITSELF.
 1837                         00,3120  22 147 0            LXCH     MODE          MODE IS NOW DP (L ZERO AFTER DAS).

 1838                         00,3121  0 0006 1            EXTEND                 STORE SQUARE OF LENGTH IN WORK AREA.
 1839                         00,3122  3 0141 0            DCA      MPAC
 1840                         00,3123  50 104 1            INDEX    FIXLOC
 1841                         00,3124  52 043 1            DXCH     LVSQUARE

 1842                         00,3125  0 3262 1  SQRT      TC       SQRTSUB       TAKE THE SQUARE ROOT OF MPAC.
 1843                         00,3126  10 121 1            CCS      MPTEMP        RETURNED NORMALIZED SQUARE ROOT. SEE IF
 1844                         00,3127  1 3131 0            TCF      +2            ANY UN-NORMALIZATION REQUIRED AND EXIT
 1845                         00,3130  1 6014 0            TCF      DANZIG        IF NOT.

 1846                         00,3131  6 2273 0            AD       NEG12         A RIGHT SHIFT OF MORE THAN 13 COULD BE
 1847                         00,3132  0 0006 1            EXTEND                 REQUIRED IF INPUT WAS ZERO IN MPAC,+1.
 1848                         00,3133  6 3137 1            BZMF     SQRTSHFT      GOES HERE IN MOST CASES.
 1849                         00,3134  22 007 0            ZL                     IF A LONG SHIFT IS REQUIRED, GO TO
 1850                         00,3135  22 102 1            LXCH     ADDRWD        GENERAL RIGHT SHIFT ROUTINES.
 1851                         00,3136  1 2263 0            TCF      GENSCR +4     ADDRWD WAS ZERO TO PREVENT ROUND.

 1852                         00,3137  50 121 0  SQRTSHFT  INDEX    MPTEMP        SELECT SHIFTING BIT AND EXIT THROUGH
 1853                         00,3140  3 7630 0            CAF      BIT15         SHIFT ROUTINES.
 1854                         00,3141  54 121 1            TS       MPTEMP
 1855                         00,3142  3 7653 0            CAF      ZERO          TO ZERO MPAC +2 IN THE PROCESS.
 1856                         00,3143  1 2017 1            TCF      MPACSHR +3

 1857                         00,3144  0 6710 1  ABS       TC       BRANCH        TEST SIGN OF MPAC AND COMPLEMENT IF
 1858                         00,3145  1 6014 0            TCF      DANZIG
 1859                         00,3146  1 6014 0            TCF      DANZIG
 1860                         00,3147  1 7605 1            TCF      COMP
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00,3150   4 7644 1   VDEF     CS       FOUR          VECTOR DEFINE - ESSENTIALLY TREATS
00,3151   26 152 0            ADS      PUSHLOC       SCALAR IN MPAC AS X COMPONENT. PUSHES UP
00,3152   0 0006 1            EXTEND                 FOR Y AND THEN AGAIN FOR Z.
00,3153   5 0000 1            INDEX    A
00,3154   3 0003 1            DCA      2
00,3155   52 144 1            DXCH     MPAC +3
00,3156   0 0006 1            EXTEND
00,3157   5 0152 1            INDEX    PUSHLOC
00,3160   3 0001 0            DCA      0
00,3161   52 146 0            DXCH     MPAC +5
00,3162   4 7646 0            CS       ONE           MODE IS NOW VECTOR.
00,3163   1 6013 1            TCF      NEWMODE

00,3164   0 3236 0   VSQ      TC       VSQSUB        DOT MPAC WITH ITSELF.
00,3165   3 7653 0            CAF      ZERO
00,3166   1 6013 1            TCF      NEWMODE       MODE IS NOW DP.

00,3167   0 0006 1   PUSH     EXTEND                 PUSH DOWN MPAC LEAVING IT LOADED.
00,3170   3 0141 0            DCA      MPAC
00,3171   50 152 1            INDEX    PUSHLOC       PUSH DOWN FIRST TWO REGISTERS IN EACH
00,3172   52 001 1            DXCH     0

00,3173   50 147 0            INDEX    MODE          INCREMENT PUSHDOWN POINTER.
00,3174   3 6164 1            CAF      NO.WDS
00,3175   26 152 0            ADS      PUSHLOC

00,3176   10 147 1            CCS      MODE
00,3177   1 3212 1            TCF      TPUSH         PUSH DOWN MPAC +2.
00,3200   1 6014 0            TCF      DANZIG        DONE FOR DP.

00,3201   0 0006 1            EXTEND                 ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
00,3202   3 0144 0            DCA      MPAC +3
00,3203   50 152 1            INDEX    PUSHLOC
00,3204   51'775 0            DXCH     0 -4
00,3205   0 0006 1            EXTEND
00,3206   3 0146 1            DCA      MPAC +5
00,3207   50 152 1            INDEX    PUSHLOC
00,3210   51'777 1            DXCH     0 -2
00,3211   1 6014 0            TCF      DANZIG

00,3212   3 0142 0   TPUSH    CA       MPAC +2
00,3213   1 6557 1            TCF      ENDTPUSH +2

00,3214   50 104 1   RVQ      INDEX    FIXLOC        RVQ - RETURN IVA QPRET.
00,3215   3 0052 0            CA       QPRET
00,3216   1 6651 1            TCF      GOTO +1
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        LIST-PROCESSING INTERPRETER                                                      USER'S OWN PAGE NO.  73

P1900            THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE
R1902   SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.

 1903                     00,3217   3 0141 0  DSQSUB    CA       MPAC +1             SQUARES THE SCALAR CONTENTS OF MPAC.
 1904                     00,3220   0 0006 1            EXTEND
 1905                     00,3221   7 0000 0            SQUARE
 1906                     00,3222  54 142 1             TS       MPAC +2
 1907                     00,3223   3 7653 0            CAF      ZERO                FORM 2(CROSS TERM).
 1908                     00,3224  56 141 0             XCH      MPAC +1
 1909                     00,3225   0 0006 1            EXTEND
 1910                     00,3226   7 0140 0            MP       MPAC
 1911                     00,3227  20 001 1             DDOUBL                       AND MAYBE OVERFLOW.
 1912                     00,3230  20 142 1             DAS      MPAC +1             AND SET A TO NET OVERFLOW.
 1913                     00,3231  56 140 1             XCH      MPAC
 1914                     00,3232   0 0006 1            EXTEND
 1915                     00,3233   7 0000 0            SQUARE
 1916                     00,3234  20 141 1             DAS      MPAC
 1917                     00,3235   0 0002 0            TC       Q

 1918                     00,3236   0 0006 1  VSQSUB    EXTEND                       DOTS THE VECTOR IN MPAC WITH ITSELF.
 1919                     00,3237  22 123 1             QXCH     DOTRET
 1920                     00,3240   0 3217 0            TC       DSQSUB              SQUARE THE X COMPONENT.
 1921                     00,3241  52 144 1             DXCH     MPAC +3
 1922                     00,3242  52 141 1             DXCH     MPAC
 1923                     00,3243  52 115 0             DXCH     BUF                 SO WE CAN END IN DOTSUB.
 1924                     00,3244   3 0142 0            CA       MPAC +2
 1925                     00,3245  54 116 0             TS       BUF +2

 1926                     00,3246   0 3217 0            TC       DSQSUB              SQUARE Y COMPONENT.
 1927                     00,3247  52 142 1             DXCH     MPAC +1
 1928                     00,3250  20 116 0             DAS      BUF +1
 1929                     00,3251   6 0140 1            AD       MPAC
 1930                     00,3252   6 0114 0            AD       BUF
 1931                     00,3253  54 114 1             TS       BUF
 1932                     00,3254   1 3256 1            TCF      +2
 1933                     00,3255  54 105 1             TS       OVFIND              IF OVERFLOW.

 1934                     00,3256  52 146 0             DXCH     MPAC +5
 1935                     00,3257  52 141 1             DXCH     MPAC
 1936                     00,3260   0 3217 0            TC       DSQSUB              SQUARE Z COMPONENT.
 1937                     00,3261   1 7163 0            TCF      ENDDOT              END AS IN DOTSUB.
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P1938          DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY
R1940    IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO
R1942    .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.


 1943                      00,3262  3 7653 0  SQRTSUB  CAF    ZERO           START BY ZEROING RIGHT SHIFT COUNT.
 1944                      00,3263  54 121 1           TS     MPTEMP

 1945                      00,3264  10 140 0           CCS    MPAC           CHECK FOR POSITIVE ARGUMENT, SHIFTING
 1946                      00,3265  1 3322 0           TCF    SMPAC+         FIRST SIGNIFICANT MPAC REGISTER INTO
 1947                      00,3266  1 3270 0           TCF    +2             MPAC ITSELF.
 1948                      00,3267  1 3312 0           TCF    SQRTNEG        SEE IF MAG OF ARGUMENT LESS THAN 10(-4).

 1949                      00,3270  56 142 0           XCH    MPAC +2        MPAC IS ZERO - SHIFT LEFT 14.
 1950                      00,3271  56 141 0           XCH    MPAC +1
 1951                      00,3272  54 140 0           TS     MPAC
 1952                      00,3273  3 7652 1           CAF    SEVEN          AUGMENT RIGHT SHIFT COUNTER.
 1953                      00,3274  54 121 1           TS     MPTEMP

 1954                      00,3275  10 140 0           CCS    MPAC           SEE IF MPAC NOW PNZ.
 1955                      00,3276  1 3322 0           TCF    SMPAC+
 1956                      00,3277  1 3301 1           TCF    +2
 1957                      00,3300  1 3315 1           TCF    ZEROANS        NEGATIVE BUT LESS THAN 10(-4) IN MAG.

 1958                      00,3301  56 141 0           XCH    MPAC +1        ZERO - SHIFT LEFT 14 AGAIN.
 1959                      00,3302  54 140 0           TS     MPAC
 1960                      00,3303  3 7652 1           CAF    SEVEN          AUGMENT RIGHT SHIFT COUNTER.
 1961                      00,3304  26 121 1           ADS    MPTEMP

 1962                      00,3305  10 140 0           CCS    MPAC
 1963                      00,3306  1 3322 0           TCF    SMPAC+
 1964                      00,3307  0 0002 0           TC     Q              SQRT(0) = 0.
 1965                      00,3310  1 3315 1           TCF    ZEROANS
 1966                      00,3311  0 0002 0           TC     Q


 1967                      00,3312  10 000 0  SQRTNEG  CCS    A              ARGUMENT IS NEGATIVE, BUT SEE IF SIGN-
 1968                      00,3313  1 3321 0           TCF    SQRTABRT       CORRECTED ARGUMENT IS LESS THAN 10(-4)

 1969                      00,3314  10 141 1           CCS    MPAC +1        IN MAGNITUDE. IF SO, CALL ANSWER ZERO.
 1970                      00,3315  3 7653 0  ZEROANS  CAF    ZERO           FORCE ANSWER TO ZERO HERE.
 1971                      00,3316  1 3365 0           TCF    FIXROOT
 1972                      00,3317  1 3321 0           TCF    SQRTABRT
 1973                      00,3320  1 3365 0           TCF    FIXROOT

 1974                      00,3321  0 3321 1  SQRTABRT TC
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00,3322  6 2410 0  SMPAC+   AD      -1/2+2     SEE IF ARGUMENT GREATER THAN OR EQUAL TO
00,3323  0 0006 1           EXTEND             .5.
00,3324  6 3370 0           BZMF    SRTEST     IF SO, SEE IF LESS THAN .25.

00,3325  52 141 1           DXCH    MPAC       WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
00,3326  22 021 1           LXCH    SR         SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
00,3327  0 0006 1           EXTEND
00,3330  7 7631 0           MP      HALF
00,3331  52 141 1           DXCH    MPAC
00,3332  56 021 1           XCH     SR
00,3333  26 141 1           ADS     MPAC +1    GUARANTEED NO OVERFLOW.

00,3334  3 2274 1  ARGHI    CAF     SLOPEHI    ARGUMENT BETWEEN .25 AND .5. GET A
00,3335  0 0006 1           EXTEND             LINEAR APPROXIMATION FOR THIS RANGE.
00,3336  7 0140 0           MP      MPAC
00,3337  6 2510 1           AD      BIASHI     X0/2 = (MPAC/2)(SLOPEHI) + BIASHI/2.

00,3340  54 114 1   +4      TS      BUF        X0/2 (ARGLO ENTERS HERE).
00,3341  0 0006 1           EXTEND
00,3342  10 114 1           DV      BUF        (MPAC/2)/(X0/2)
00,3343  0 0006 1           EXTEND
00,3344  7 7631 0           MP      HALF
00,3345  26 114 1           ADS     BUF        X1 = X0/2 + .5(MPAC/2)/(X0/2).

00,3346  0 0006 1           EXTEND
00,3347  7 7631 0           MP      HALF       FORM UP X1/2.
00,3350  52 141 1           DXCH    MPAC       SAVE AND BRING OUT ARGUMENT.
00,3351  0 0006 1           EXTEND             TAKE DP QUOTIENT WITH X1.
00,3352  10 114 1           DV      BUF
00,3353  54 115 0           TS      BUF +1     SAVE MAJOR PART OF QUOTIENT.
00,3354  3 7653 0           CAF     ZERO       FORM MINOR PART OF QUOTIENT USING
00,3355  56 001 0           XCH     L          (REMAINDER,0).
00,3356  0 0006 1           EXTEND
00,3357  10 114 1           DV      BUF
00,3360  54 001 1           TS      L          IN PREPARATION FOR DAS.
00,3361  3 0115 1           CA      BUF +1
00,3362  20 141 1           DAS     MPAC       X2 = X1/2 + (MPAC/2)X1

00,3363  10 000 0           CCS     A          OVERFLOWS IF ARGUMENT WAS NEAR POSMAX.
00,3364  3 7626 1           CAF     POSMAX
00,3365  54 140 0  FIXROOT  TS      MPAC
00,3366  54 141 1           TS      MPAC +1
00,3367  0 0002 0           TC      Q          RETURN TO CALLER TO UNNORMALIZE, ETC.
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00,3370  6 7632 1  SRTEST    AD      QUARTER        ARGUMENT WAS LESS THAN .5, SEE IF LESS
00,3371  0 0006 1            EXTEND                 THAN .25.
00,3372  6 3414 0            BZMF    SQRTNORM       IF SO, BEGIN NORMALIZATION.

00,3373  52 141 1            DXCH    MPAC           IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
00,3374  22 021 1            LXCH    SR             START AT ARGLO.
00,3375  0 0006 1            EXTEND
00,3376  7 7631 0            MP      HALF
00,3377  52 141 1            DXCH    MPAC
00,3400  56 021 1            XCH     SR
00,3401  26 141 1            ADS     MPAC +1        NO OVERFLOW.

00,3402  3 2740 0  ARGLO     CAF     SLOPELO        (NORMALIZED) ARGUMENT BETWEEN .125 AND
00,3403  0 0006 1            EXTEND                 .25
00,3404  7 0140 0            MP      MPAC
00,3405  6 2250 1            AD      BIASLO
00,3406  1 3340 1            TCF     ARGHI +4       BEGIN SQUARE ROOT.

00,3407  0 0006 1  SQRTNM2   EXTEND                 SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
00,3410  3 0142 0            DCA     MPAC +1        COUNT (FOR TERMINAL UNNORMALIZATION).
00,3411  20 142 1            DAS     MPAC +1
00,3412  6 0140 1            AD      MPAC
00,3413  26 140 0            ADS     MPAC           (NO OVERFLOW).

00,3414  24 121 0  SQRTNORM  INCR    MPTEMP         FIRST TIME THROUGH, JUST SHIFT LEFT 1
00,3415  0 0006 1            EXTEND                 (PUTS IN EFFECTIVE RIGHT SHIFT SINCE
00,3416  3 0142 0            DCA     MPAC +1        WE WANT MPAC/2).
00,3417  20 142 1            DAS     MPAC +1
00,3420  6 0140 1            AD      MPAC
00,3421  26 140 0            ADS     MPAC           (AGAIN NO OVERFLOW).
00,3422  6 0000 1            DOUBLE
00,3423  54 022 0            TS      CYL

00,3424  10 022 0  NORMTEST  CCS     CYL            SEE IF ARGUMENT NOW NORMALIZED AT
00,3425  10 022 0            CCS     CYL            GREATER THAN .125.
00,3426  1 3407 0            TCF     SQRTNM2        NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
00,3427  1 3334 1            TCF     ARGHI          YES - NOW BETWEEN .5 AND .25.
00,3430  1 3402 0            TCF     ARGLO          ARGUMENT NOW BETWEEN .25 AND .125.
```

```
P2046    TRIGONOMETRIC FUNCTION PACKAGE.

R2047              THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2049              1.  SIN                 COMPUTES (1/2)SINE(2 PI MPAC).
R2050              2.  COS                 COMPUTES (1/2)COSINE(2 PI MPAC).

R2051              3.  ASIN                COMPUTES (1/2PI)ARCSINE(2 MPAC).
R2052              4.  ACOS                COMPUTES (1/2PI)ARCCOSINE(2 MPAC).

R2053    SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE, IE SIN(ASIN(X)) = X.


 2054                        00,3431  0 6710 1  COSINE    TC      BRANCH          FINDS COSINE USING THE IDENTITY
 2055                        00,3432  1 3435 1            TCF     +3              COS(X) = SIN(PI/2 - ABS(X)).
 2056                        00,3433  1 3440 0            TCF     PRESINE
 2057                        00,3434  1 3440 0            TCF     PRESINE

 2058                        00,3435  0 0006 1   +3       EXTEND
 2059                        00,3436  4 0141 1            DCS     MPAC
 2060                        00,3437  52 141 1            DXCH    MPAC

 2061                        00,3440  3 7632 1  PRESINE   CAF     QUARTER         PI/2 SCALED.
 2062                        00,3441  26 140 0            ADS     MPAC



 2063                        00,3442  52 141 1  SINE      DXCH    MPAC            DOUBLE ARGUMENT.
 2064                        00,3443  20 001 1            DDOUBL
 2065                        00,3444  54 000 0            OVSK                    SEE IF OVERFLOW PRESENT.
 2066                        00,3445  1 3450 1            TCF     +3              IF NOT, ARGUMENT OK AS IS.

 2067                        00,3446  0 0006 1            EXTEND                  IF SO, WE LOST (OR GAINED) PI, SO
 2068                        00,3447  4 0001 1            DCOM                    COMPLEMENT MPAC USING THE IDENTITY
A2069                                                                             SIN(X-(+)PI) = SIN(-X).
 2070                        00,3450  52 141 1   +3       DXCH    MPAC
 2071                        00,3451  3 0140 1            CA      MPAC            SEE IF ARGUMENT GREATER THAN .5 IN
 2072                        00,3452  6 0000 1            DOUBLE                  MAGNITUDE. IF SO, REDUCE IT TO LESS THAN
 2073                        00,3453  54 001 1            TS      L               .5 (+-PI/2 SCALED) AS FOLLOWS:
 2074                        00,3454  1 3465 1            TCF     SN1

 2075                        00,3455  50 000 1            INDEX   A               IF POSITIVE, FORM PI - X, IF NEGATIVE
 2076                        00,3456  3 7630 0            CAF     NEG1/2 +1       USE -PI - X.
 2077                        00,3457  6 0000 1            DOUBLE
 2078                        00,3460  0 0006 1            EXTEND
 2079                        00,3461  60 140 1            SU      MPAC            GUARANTEED NO OVERFLOW.
 2080                        00,3462  54 140 0            TS      MPAC
 2081                        00,3463  4 0141 1            CS      MPAC +1
 2082                        00,3464  54 141 1            TS      MPAC +1
 2083         00,3465  0 0006 1  SN1    EXTEND               SET UP TO EVALUATE HASTINGS POLYNOMIAL
 2084         00,3466  3 0141 0         DCA     MPAC
 2085         00,3467 52 120  0         DXCH    BUF2
 2086         00,3470  0 3217 0         TC      DSQSUB       SQUARE MPAC.

 2087         00,3471  0 7173 0         TC      POLY         EVALUATE FOURTH ORDER POLYNOMIAL.
 2088         00,3472   00003 1         DEC     3
 2089         00,3473   14441 0         2DEC    +.3926990796
C2089         00,3474   37325 1
 2090         00,3475   53250 0         2DEC    -.6459637111
C2090         00,3476   60764 1
 2091         00,3477   12146 1         2DEC    +.318758717
C2091         00,3500   21276 1
 2092         00,3501   75466 1         2DEC    -.074780249
C2092         00,3502   71471 0
 2093         00,3503   00236 0         2DEC    +.009694988
C2093         00,3504   32757 0
 2094         00,3505  3 2434 0         CAF     LBUF2        MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
 2095         00,3506  0 7065 0         TC      DMPSUB -1

 2096         00,3507  0 0006 1         EXTEND
 2097         00,3510  3 0142 0         DCA     MPAC +1
 2098         00,3511 20 142  1         DAS     MPAC +1
 2099         00,3512  6 0140 1         AD      MPAC
 2100         00,3513 26 140  0         ADS     MPAC         NEITHER SHIFT OVERFLOWS.
 2101         00,3514  0 0006 1         EXTEND
 2102         00,3515  3 0142 0         DCA     MPAC +1
 2103         00,3516 20 142  1         DAS     MPAC +1
 2104         00,3517  6 0140 1         AD      MPAC
 2105         00,3520 26 140  0         ADS     MPAC
 2106         00,3521  1 6014 0         TCF     DANZIG
```

```
          ARCSIN/ARCCOS ROUTINE.

                    00,3522  3 3543 0  ARCSIN   CAF    LASINEX       COMPUTE ARCSIN BY USING THE IDENTITY
                    00,3523  1 3525 1           TCF    +2            ARCSIN(X) = PI/2 - ARCCOS(X).

                    00,3524  3 3625 0  ARCCOS   CAF    LDANZIG       (EXITS IMMEDIATELY).
                    00,3525  54 122 1           TS     ESCAPE
                    00,3526  0 6710 1           TC     BRANCH        TEST SIGN OF INPUT.
                    00,3527  1 3537 1           TCF    ACOSST        START IMMEDIATELY IF POSITIVE.
                    00,3530  1 3640 1           TCF    ACOSZERO      ARCCOS(0) = PI/2 = .25.
                    00,3531  0 0006 1           EXTEND               IF NEGATIVE, USE THE IDENTITY
                    00,3532  4 0141 1           DCS    MPAC          ARCCOS(X) = PI - ARCCOS(-X), FORCING
                    00,3533  52 141 1           DXCH   MPAC          ARGUMENT POSITIVE.
                    00,3534  3 2247 1           CAF    TCSUBTR       SET EXIT  TO DO ABOVE BEFORE
                    00,3535  56 122 0           XCH    ESCAPE        ARCSIN/ARCCOS CONSIDERATIONS.
                    00,3536  54 123 0           TS     ESCAPE2

                    00,3537  4 7631 0  ACOSST   CS     HALF          TEST MAGNITUDE OF INPUT.
                    00,3540  6 0140 1           AD     MPAC
                    00,3541  10 000 0           CCS    A
                    00,3542  1 3633 0           TCF    ACOSOVF       THIS IS PROBABLY AN OVERFLOW CASE.

                    00,3543  1 3621 0  LASINEX  TCF    ASINEX

                    00,3544  1 3554 1           TCF    ACOSST2       NO OVERFLOW - PROCEED.

                    00,3545  10 141 1           CCS    MPAC +1       IF MAJOR PART IS .5, CALL ANSWER 0
                    00,3546  3 7653 0           CAF    ZERO          UNLESS MINOR PART NEGATIVE.
                    00,3547  1 3551 1           TCF    ACOS=0

                    00,3550  1 3554 1           TCF    ACOSST2

                    00,3551  54 141 1  ACOS=0   TS     MPAC +1
                    00,3552  54 140 0           TS     MPAC
                    00,3553  0 0122 0           TC     ESCAPE

                    00,3554  0 0006 1  ACOSST2  EXTEND               NOW THAT ARGUMENT IS IN PROPER RANGE,
                    00,3555  4 0141 1           DCS    MPAC          BEGIN COMPUTATION. USE HASTINGS
                    00,3556  6 7631 1           AD     HALF          APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
                    00,3557  52 141 1           DXCH   MPAC          IN A SCALED VERSION WHERE P(X) IS A
                    00,3560  52 120 0           DXCH   BUF2          SEVENTH ORDER POLYNOMIAL.

                    00,3561  0 3262 1           TC     SQRTSUB       RETURNS WITH NORMALIZED SQUARE ROOT.

                    00,3562  10 121 1           CCS    MPTEMP        SEE IF UN-NORMALIZATION REQUIRED.
                    00,3563  1 3626 1           TCF    ACOSSHR       IF SO.
```

```
 2142                00,3564  52 141 1  ACOS3     DXCH    MPAC              SET UP FOR POLYNOMIAL EVALUATION.
 2143                00,3565  52 120 0            DXCH    BUF2
 2144                00,3566  52 141 1            DXCH    MPAC

 2145                00,3567  0 7173 0            TC      POLY
 2146                00,3570   00006 1            DEC     6
 2147                00,3571   13240 0            2DEC    +.353553385       COEFFICIENTS ARE C 2(+I)/PISQRT(2) WHERE
C2147                00,3572   23630 0
 2148                00,3573   74721 0            2DEC*   -.0483017006 B+1*                I
C2148                00,3574   47775 1
 2149                00,3575   02440 0            2DEC*   +.0200273085 B+2*     WHERE C STANDS FOR ORIGINAL COEFFS.
C2149                00,3576   20237 0
 2150                00,3577   75067 1            2DEC*   -.0112931863 B+3*
C2150                00,3600   70742 1
 2151                00,3601   03436 0            2DEC*   +.00695311612 B+4*
C2151                00,3602   26756 1
 2152                00,3603   74037 0            2DEC*   -.00384617957 B+5*
C2152                00,3604   57640 1
 2153                00,3605   03046 0            2DEC*   +.001501297736 B+6*
C2153                00,3606   07143 0
 2154                00,3607   76654 1            2DEC*   -.000284160334 B+7*
C2154                00,3610   42244 0
 2155                00,3611  3 2434 0            CAF     LBUF2             DO FINAL MULTIPLY AND GO TO ANY
 2156                00,3612  0 7065 0            TC      DMPSUB -1         EPILOGUE SEQUENCES.
 2157                00,3613  0 0122 0            TC      ESCAPE

 2158                00,3614  0 0006 1  SUBTR     EXTEND                    EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
 2159                00,3615  4 0141 1            DCS     MPAC
 2160                00,3616  6 7631 1            AD      HALF              FORMS PI - ARCCOS(-X) = ARCCOS(X).
 2161                00,3617  52 141 1            DXCH    MPAC
 2162                00,3620  0 0123 1            TC      ESCAPE2           GO TO POSSIBLE ARCSIN EPILOGUE.

 2163                00,3621  0 0006 1  ASINEX    EXTEND
 2164                00,3622  4 0141 1            DCS     MPAC              ARCSIN EPILOGUE - GET ARCSIN(X)
 2165                00,3623  6 7632 1            AD      QUARTER           = PI/2 - ARCCOS(X).
 2166                00,3624  52 141 1            DXCH    MPAC
 2167                00,3625  1 6014 0  LDANZIG   TCF     DANZIG
```

```
00,3626  50 000 1  ACOSSHR   INDEX   A              THE SHIFT RIGHT IS LESS THAN 14 SINCE
00,3627  3 7631 1            CAF     BIT14          THE INPUT WAS NON-ZERO DP.
00,3630  54 121 1            TS      MPTEMP
00,3631  0 2054 1            TC      VSHRRND        DP SHIFT RIGHT AND ROUND.
00,3632  1 3564 1            TCF     ACOS3          PROCEED.

00,3633  10 000 0  ACOSOVF   CCS     A              IF MAJOR PART WAS ONLY 1 MORE THAN .5,
00,3634  1 3636 0            TCF     +2             CALL ANSWER 0.
00,3635  1 3551 1            TCF     ACOS=0
00,3636  1 3551 1            TCF     ACOS=0

00,3637  0 3637 0  ACOSABRT  TC

00,3640  3 7632 1  ACOSZERO  CAF     QUARTER        ACOS(0) = PI/2.
00,3641  1 3552 1            TCF     ACOS=0 +1      SET MPAC AND EXIT VIA ESCAPE.
```

```
P2180           THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2182            1.  AXT                 ADDRESS TO INDEX TRUE.
R2183            1.  AXC                 ADDRESS TO INDEX COMPLEMENTED.
R2184            3.  LXA                 LOAD INDEX FROM ERASABLE.
R2185            4.  LXC                 LOAD INDEX COMPLEMENTED FROM ERASABLE.
R2186            5.  SXA                 STORE INDEX IN ERASABLE.
R2187            6.  XCHX                EXCHANGE INDEX REIGSTER WITH ERASABLE.

R2188            7.  INCR                INCREMENT INDEX REGISTER.
R2189            8.  XAD                 ERASABLE ADD TO INDEX REGISTER.
R2190            9.  XSU                 ERASABLE SUBTRACT FROM INDEX REGISTER.

R2191           10.  TIX                 BRANCH ON INDEX REGISTER AND DECREMENT.


 2192                          01,2000                SETLOC 12000         SUFFIX CLASS 01 IS IN BANK 1.

 2193                01,2000   0 2061 1  AXT          TC     TAGSUB        SELECT APPROPRIATE INDEX REGISTER.
 2194                01,2001   3 0103 0               CA     POLISH
 2195                01,2002  50 114 0   XSTORE       INDEX  INDEXLOC      CONTAINS C(FIXLOC) OR C(FIXLOC)+1.
 2196                01,2003  54 046 1                TS     X1
 2197                01,2004   1 6014 0               TCF    DANZIG

 21971               01,2005   0 2061 1  AXC          TC     TAGSUB
 21972               01,2006   4 0103 1               CS     POLISH
 21973               01,2007   0 2002 1               TC     XSTORE

 2198                01,2010   0 2061 1  LXA          TC     TAGSUB        LOAD INDEX FROM ERASABLE.
 2199                01,2011  50 102 1                INDEX  ADDRWD
 2200                01,2012   3 0000 1               CA     0
 2201                01,2013   1 2002 0               TCF    XSTORE

 2202                01,2014   0 2061 1  LXC          TC     TAGSUB        LOAD INDEX FROM ERASABLE COMPLEMENTED.
 2203                01,2015  50 102 1                INDEX  ADDRWD
 2204                01,2016   4 0000 0               CS     0
 2205                01,2017   1 2002 0               TCF    XSTORE

 2206                01,2020   0 2061 1  SXA          TC     TAGSUB        STORE INDEX IN ERASABLE.
 2207                01,2021  50 114 0                INDEX  INDEXLOC
 2208                01,2022   3 0046 0               CA     X1
 2209                01,2023   1 6626 1               TCF    STORE1        (STORE SINGLE PRECISION BEFORE EXIT).

 2210                01,2024   0 2061 1  XCHX         TC     TAGSUB        EXCHANGE INDEX REGISTER WITH ERASABLE.
 2211                01,2025  50 102 1                INDEX  ADDRWD
 2212                01,2026   3 0000 1               CA     0
 2213                01,2027  50 114 0                INDEX  INDEXLOC
 2214                01,2030  56 046 0                XCH    X1
 2215                01,2031   1 6626 1               TCF    STORE1
```

```
2216      01,2032  0 2061 1  XAD      TC      TAGSUB      ERASABLE ADD TO INDEX.
2217      01,2033  50 102 1           INDEX   ADDRWD
2218      01,2034  3 0000 1           CA      0
2219      01,2035  50 114 0  XAD2     INDEX   INDEXLOC
2220      01,2036  26 046 1           ADS     X1          IGNORING OVERFLOWS.
2221      01,2037  1 6014 0           TCF     DANZIG

2222      01,2040  0 2061 1  INCR     TC      TAGSUB      INCREMENT INDEX REGISTER.
2223      01,2041  3 0103 0           CA      POLISH
2224      01,2042  1 2035 1           TCF     XAD2

2225      01,2043  0 2061 1  XSU      TC      TAGSUB      ERASABLE SUBTRACT FROM INDEX.
2226      01,2044  50 102 1           INDEX   ADDRWD
2227      01,2045  4 0000 0           CS      0
2228      01,2046  1 2035 1           TCF     XAD2


2229      01,2047  0 2061 1  TIX      TC      TAGSUB      BRANCH AND DECREMENT ON INDEX.
2230      01,2050  50 114 0           INDEX   INDEXLOC
2231      01,2051  4 0046 1           CS      X1
2232      01,2052  50 114 0           INDEX   INDEXLOC
2233      01,2053  6 0046 0           AD      X1
2234      01,2054  0 0006 1           EXTEND              NO OPERATION IF DECREMENTED INDEX IS
2235      01,2055  6 6014 1           BZMF    DANZIG      NEGATIVE OR ZERO.

2236      01,2056  50 114 0  DOTIXBR  INDEX   INDEXLOC
2237      01,2057  56 046 0           XCH     X1          IGNORING OVERFLOWS.

2238      01,2060  1 6650 0           TCF     GOTO        DO THE BRANCH USING THE CADR IN POLISH.


R2239          SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY, THE ADDRESS -38D.)

2241      01,2061  3 0104 1  TAGSUB   CA      FIXLOC
2242      01,2062  54 114 1           TS      INDEXLOC

2243      01,2063  10 020 1           CCS     CYR         BIT 15 SPECIFIES INDEX.
2244      01,2064  24 114 0           INCR    INDEXLOC    0 MEANS USE X2.
2245      01,2065  0 0002 0           TC      Q
2246      01,2066  0 0002 0           TC      Q           1 FOR X1.
```

```
P2247            MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES. INCLUDED HERE ARE:

R2249            1.  ITA                  STORE QPRET (RETURN ADDRESS) IN ERASABLE.
R2251            2.  CALL                 CALL A SUBROUTINE, LEAVING RETURN IN QPRET.
R2253            3.  RTB                  RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.
R2255            4.  BHIZ                 BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).
R2257            5.  BOV                  BRANCH ON OVERFLOW.
R2258            6.  GOTO                 SIMPLE SEQUENCE CHANGE.

 2259                      01,2067  10 020 1  RTB/BHIZ CCS     CYR
 2260                      01,2070  3 0103 0  RTB      CA      POLISH
 2261                      01,2071  1 4105 0           TCF     BANKJUMP          CALL BASIC ROUTINE.

 2262                      01,2072  10 140 0  BHIZ     CCS     MPAC
 2263                      01,2073  1 6014 0           TCF     DANZIG
 2264                      01,2074  1 6650 0           TCF     GOTO
 2265                      01,2075  1 6014 0           TCF     DANZIG
 2266                      01,2076  1 6650 0           TCF     GOTO

 2267                      01,2077  10 105 1  BOV(B)   CCS     OVFIND            BRANCH ON OVERFLOW TO BASIC OR INTERP.
 2268                      01,2100  1 2102 1           TCF     +2
 2269                      01,2101  1 6014 0           TCF     DANZIG
 2270                      01,2102  54 105 1           TS      OVFIND
 2271                      01,2103  10 020 1           CCS     CYR
 2272                      01,2104  1 2070 0           TCF     RTB               IF BASIC.
 2273                      01,2105   00360 1  B5TOB8   OCT     360
 2274                      01,2106  1 6650 0           TCF     GOTO
```

```
       LIST-PROCESSING INTERPRETER                                                      USER'S OWN PAGE NO.  85

 2275                    01,2107  10 020 1  BZE/GOTO CCS    CYR            SEE WHICH OP-CODE IS DESIRED.
 2276                    01,2110   0 6710 1          TC     BRANCH         DO BZE.
 2277                    01,2111   1 6014 0          TCF    DANZIG
 2278                    01,2112   1 6650 0          TCF    GOTO           DO GOTO.
 2279                    01,2113   1 6014 0          TCF    DANZIG

 2280                    01,2114  10 020 1  BPL/BMN  CCS    CYR
 2281                    01,2115   1 2123 1          TCF    BPL
 2282                    01,2116    12000 1  5B10     DEC    5 B+10         SHIFTS OP CODE IN SWITCH INSTRUCTION ADR

 2283                    01,2117   0 6710 1          TC     BRANCH         DO BMN.
 2284                    01,2120   1 6014 0          TCF    DANZIG
 2285                    01,2121   1 6014 0          TCF    DANZIG
 2286                    01,2122   1 6650 0          TCF    GOTO           ONLY IF NNZ.

 2287                    01,2123   0 6710 1  BPL      TC     BRANCH
 2288                    01,2124   1 6650 0          TCF    GOTO           IF POSITIVE OR ZERO.
 2289                    01,2125   1 6650 0          TCF    GOTO
 2290                    01,2126   1 6014 0          TCF    DANZIG

 2291                    01,2127  10 020 1  CALL/ITA CCS    CYR
 2292                    01,2130   1 6643 1          TCF    CALL

 2293                    01,2131    00017 1  LOW4     OCT    17             MASK USED BY SWITCH INSTRUCTIONS.

 2294                    01,2132  50 104 1           INDEX  FIXLOC         STORE QPRET.
 2295                    01,2133   3 0052 0          CA     QPRET
 2296                    01,2134   1 6626 1          TCF    STORE1
```

```
P2297           THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES:

R2299   00      BONSET                  SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2300   01      SETGO                   SET A SWITCH AND DO A GOTO.
R2301   02      BOFSET                  SET A SWITCH AND DO A GOTO IF IT WAS OFF
R2302   03      SET                     SET A SWITCH.

R2303   04      BONINV                  INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2304   05      INVGO                   INVERT A SWITCH AND DO A GOTO.
R2305   06      BOFINV                  INVERT A SWITCH AND BRANCH IF IT WAS OFF
R2306   07      INVERT                  INVERT A SWITCH.

R2307   10      BONCLR                  CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2308   11      CLRGO                   CLEAR A SWITCH AND DO A GOTO.
R2309   12      BOFCLR                  CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2310   13      CLEAR                   CLEAR A SWITCH.

R2311   14      BON                     BRANCH IF A SWITCH WAS ON.
R2312   16      BOFF                    BRANCH IF A SWITCH WAS OFF.


R2313           THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS:

R2315           BITS 1-4    SWITCH BIT NUMBER (1-15).
R2316           BITS 5-8    SWITCH OPERATION NUMBER.
R2317           BITS 9-     SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2318           THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO
R2320   ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.


 2322                   01,2135  3 2131 0  SWITCHES CAF     LOW4            LEAVE THE SWITCH BIT IN  SWBIT  .
 2323                   01,2136  7 0103 1           MASK    POLISH
 2324                   01,2137  50 000 1           INDEX   A
 2325                   01,2140  3 7630 0           CAF     BIT15           (NUMBER FROM LEFT TO RIGHT.)
 2326                   01,2141  54 115 0           TS      SWBIT

 2327                   01,2142  3 7637 1           CAF     BIT8            LEAVE THE SWITCH WORD NUMBER IN  SWWORD  .
 2328                   01,2143  0 0006 1           EXTEND
 2329                   01,2144  7 0103 1           MP      POLISH
 2330                   01,2145  54 114 1           TS      SWWORD

 23305                  01,2146  0 0004 0           INHINT                  DURING SWITCH CHANGE SO RUPT CAN USE TOO
 2331                   01,2147  50 000 1           INDEX   A               LEAVE THE SWITCH WORD ITSELF IN L.
 2332                   01,2150  3 0620 0           CA      STATE
 2333                   01,2151  54 002 1           TS      Q               Q WILL BE USED AS A CHANNEL.
```

```
01,2152   3 7634 1              CAF      BIT11
01,2153   0 0006 1              EXTEND                 DISPATCH SWITCH BIT OPERATION AS IN BITS
01,2154   7 0103 1              MP       POLISH        7-8 OF POLISH.
01,2155   7 2215 1              MASK     B3TOB4        GETS 4X2-BIT CODE.
01,2156  50 000  1              INDEX    A
01,2157   1 2160 0              TCF      +1

01,2160   3 0115 1   +1         CA       SWBIT         00 - SET SWITCH IN QUESTION.
01,2161   0 0006 1              EXTEND
01,2162  04 002  1              ROR      Q
01,2163   1 2172 0              TCF      SWSTORE

01,2164   3 0115 1   +5         CA       SWBIT         01 - INVERT SWITCH.
01,2165   0 0006 1              EXTEND
01,2166  06 002  0              RXOR     Q
01,2167   1 2172 0              TCF      SWSTORE

01,2170   4 0115 0   +9D        CS       SWBIT         10 - CLEAR.
01,2171   7 0002 1              MASK     Q
01,2172  50 114  0   SWSTORE    INDEX    SWWORD
01,2173  54 620  1              TS       STATE         NEW SWITCH WORD.
```

```
2352               01,2174  0 0003 1   +13D     RELINT            11 - NOOP.
23525              01,2175  3 7632 1            CAF     BIT13
2353               01,2176  0 0006 1            EXTEND            DISPATCH SEQUCE CHANGING OR BRANCHING
2354               01,2177  7 0103 1            MP      POLISH    CODE.
2355               01,2200  7 2215 1            MASK    B3TOB4
2356               01,2201  50 000 1            INDEX   A
2357               01,2202  1 2203 0            TCF     +1        ORIGINALLY STORED IN BITS 5-6.

2358               01,2203  4 0002 1   +1       CS      Q         00 - BRANCH IF ON.
2359               01,2204  7 0115 0  TEST      MASK    SWBIT
2360               01,2205  10 000 0            CCS     A
2361               01,2206  1 2216 1            TCF     SWSKIP

2362               01,2207  1 6702 0   +5       TCF     SWBRANCH  01 - GO TO.

2363               01,2210  1 2216 1            TCF     SWSKIP    HERE ONLY ON BIT 15.

2364                          01,2213           SETLOC  +2

2366               01,2213  3 0002 0   +9D      CA      Q         10 - BRANCH IF OFF.
2367               01,2214  1 2204 1            TCF     TEST

2368               01,2215    00014 1 B3TOB4    OCT     14

2369               01,2216  24 150 0  SWSKIP    INCR    LOC

2370                          01,2135 SW/       EQUALS  SWITCHES

2371               01,2217  1 6014 0   +13D     TCF     DANZIG    11 - NOOP.

2372                          01,2220 ENDINTS1  EQUALS
```

```
              THE FOLLOWING ROUTINE CAN BE USED TO CALL A SUBROUTINE IN ANOTHER BANK. IN THE BANKCALL VERSION, THE
      CADR OF THE SUBROUTINE IMMEDIATELY FOLLOWS THE  TC BANKCALL  INSTRUCTION, WITH C(A) AND C(L) PRESERVED.

                            4063           SETLOC ENDINTFF

                      4063  52 120 0  BANKCALL DXCH   BUF2            SAVE INCOMING A,L.
                      4064  50 002 0           INDEX  Q               PICK UP CADR.
                      4065  3 0000 1           CA     0
                      4066  24 002 0           INCR   Q               SO WE RETURN TO THE LOC. AFTER THE CADR.

              SWCALL IS IDENTICAL TO BANKCALL, EXCEPT THAT THE CADR ARRIVES IN A.

                      4067  54 001 1  SWCALL   TS     L
                      4070  22 004 0           LXCH   FBANK           SWITCH BANKS, SAVING RETURN.
                      4071  7 6425 0           MASK   LOW10           GET SUB-ADDRESS OF CADR.
                      4072  56 002 0           XCH    Q               A,L NOW CONTAINS DP RETURN.
                      4073  52 120 0           DXCH   BUF2            RESTORING INPUTS IF THIS IS A BANKCALL.
                      4074  50 002 0           INDEX  Q
                      4075  0 2000 0           TC     10000           SETTING Q TO SWRETURN.

                      4076  56 120 1  SWRETURN XCH    BUF2 +1         COMES HERE TO RETURN TO CALLER. C(A,L)
                      4077  56 004 0           XCH    FBANK           ARE PRESERVED FOR RETURN.
                      4100  56 120 1           XCH    BUF2 +1
                      4101  0 0117 0           TC     BUF2


              THE FOLLOWING ROUTINE CAN BE USED AS A UNILATERAL JUMP WITH C(A,L) PRESERVED AND THE CADR IMMEDIATELY
      FOLLOWING THE TC POSTJUMP INSTRUCTION.

                      4102  56 002 0  POSTJUMP XCH    Q               SAVE INCOMING C(A).
                      4103  50 000 1           INDEX  A               GET CADR.
                      4104  3 0000 1           CA     0

              BANKJUMP IS THE SAME AS POSTJUMP, EXCEPT THAT THE CADR ARRIVES IN A.

                      4105  54 004 1  BANKJUMP TS     FBANK
                      4106  7 6425 0           MASK   LOW10
                      4107  56 002 0           XCH    Q               RESTORING INPUT C(A) IF THIS WAS A
                      4110  50 002 0           INDEX  Q               POSTJUMP.
                      4111  1 2000 1           TCF    10000
```

```
P0036             THE FOLLOWING ROUTINE GETS THE RETURN CADR SAVED BY SWCALL OR BANKCALL AND LEAVES IT IN A.

 0038                         4112  3 6425 1  MAKECADR CAF     LOW10
 0039                         4113  7 0117 1           MASK    BUF2
 0040                         4114  6 0120 1           AD      BUF2 +1
 0041                         4115  0 0002 0           TC      Q


R0042             THE FOLLOWING ROUTINE OBTAINS THE TWO WORDS BEGINNING AT THE ADDRESS ARRIVING IN A, AND LEAVES THEM IN
R0044       A,L.

 0045                         4116  54 001 1  DATACALL TS      L
 0046                         4117  22 004 0           LXCH    FBANK
 0047                         4120  22 121 0           LXCH    MPTEMP            SAVE FORMER BANK.
 0048                         4121  7 6425 0           MASK    LOW10
 0049                         4122  0 0006 1           EXTEND
 0050                         4123  5 0000 1           INDEX   A
 0051                         4124  3 2001 1           DCA     10000

 0052                         4125  56 121 0           XCH     MPTEMP
 0053                         4126  54 004 1           TS      FBANK             RESTORE FBANK.
 0054                         4127  3 0121 0           CA      MPTEMP
 0055                         4130  0 0002 0           TC      Q

 0056                               4131  ENDIBNKF EQUALS
```

```
                        4131           SETLOC ENDIBNKF

     TO ENTER A JOB REQUEST REQUIRING NO VAC AREA:

               4131  54 632 1  NOVAC   TS     NEWPRIO       SAVE PRIORITY OF NEW JOB.
               4132  0 0006 1          EXTEND
               4133  5 0002 0          INDEX  Q             Q WILL BE UNDISTURBED THROUGHOUT.
               4134  3 0001 0          DCA    0             2CADR OF JOB ENTERED.
               4135  52 634 1          DXCH   NEWLOC
               4136  3 4214 1          CAF    EXECBANK
               4137  56 004 0          XCH    FBANK
               4140  54 626 1          TS     EXECTEM1
               4141  1 2241 0          TCF    NOVAC2        ENTER EXECUTIVE BANK.

     TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

               4142  54 632 1  FINDVAC TS     NEWPRIO
               4143  0 0006 1          EXTEND
               4144  5 0002 0          INDEX  Q
               4145  3 0001 0          DCA    0
               4146  52 634 1          DXCH   NEWLOC
               4147  3 4214 1          CAF    EXECBANK
               4150  56 004 0          XCH    FBANK
               4151  1 2220 1          TCF    FINDVAC2      OFF TO EXECUTIVE SWITCHED-BANK.

     TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED:

               4152  3 4214 1  CHANG1  CAF    EXECBANK
               4153  54 001 1          TS     L
               4154  3 0002 0          CA     Q
               4155  22 006 1   +3     LXCH   BBANK
               4156  0 0004 0          INHINT
               4157  1 2316 0          TCF    CHANJOB

     TO SUSPEND AN INTERPRETIVE JOB:

               4160  3 4214 1  CHANG2  CAF    EXECBANK
               4161  54 001 1          TS     L
               4162  4 0150 1          CS     LOC           NEGATIVE LOC SHOWS JOB INTERPRETIVE.
               4163  1 4155 0          TCF    CHANG1 +3
```

```
P0037          TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.):

 0039                     4164  54 150 1  JOBSLEEP TS      LOC
 0040                     4165  3 4214 1           CAF     EXECBANK
 0041                     4166  54 004 1           TS      FBANK
 0042                     4167  1 2375 0           TCF     JOBSLP1

R0043          TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION:

 0044                     4170  54 633 0  JOBWAKE  TS      NEWLOC
 0045                     4171  4 7645 0           CS      TWO              EXIT IS VIA FINDVAC/NOVAC PROCEDURES.
 0046                     4172  26 002 1           ADS     Q
 0047                     4173  3 4214 1           CAF     EXECBANK
 0048                     4174  56 004 0           XCH     FBANK
 0049                     4175  1 2406 0           TCF     JOBWAKE2

R0050          TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION:

 0051                     4176  0 0004 0  PRIOCHNG INHINT                   NEW PRIORITY ARRIVES IN A. RETURNS TO
 0052                     4177  54 632 1           TS      NEWPRIO          CALLER AS SOON AS NEW JOB PRIORITY IS
 0053                     4200  3 4214 1           CAF     EXECBANK         HIGHEST. PREPARE FOR POSSIBLE BASIC-
 0054                     4201  56 006 1           XCH     BBANK            STYLE CHANGE-JOB.
 0055                     4202  54 151 0           TS      BANKSET
 0056                     4203  3 0002 0           CA      Q
 0057                     4204  1 2454 1           TCF     PRIOCH2

R0058          TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS:

 0059                     4205  3 4214 1  ENDOFJOB CAF     EXECBANK
 0060                     4206  54 004 1           TS      FBANK
 0061                     4207  1 2465 0           TCF     ENDJOB1

 0062                     4210  3 0626 0  ENDFIND  CA      EXECTEM1         RETURN TO CALLER AFTER JOB ENTRY
 0063                     4211  54 004 1           TS      FBANK            COMPLETE.
 0064                     4212  50 002 0           INDEX   Q
 0065                     4213  0 0002 0           TC      2

 0066                     4214    02220 0  EXECBANK CADR    FINDVAC2
```

```
P0068             LOCATE AN AVAILABLE VAC AREA.

 0069                          01,2220            SETLOC ENDINTS1

 0070             01,2220 54 626 1  FINDVAC2 TS     EXECTEM1        (SAVE CALLER'S BANK FIRST.)
 0071             01,2221 10 264 0           CCS    VAC1USE
 0072             01,2222  1 2234 1          TCF    VACFOUND
 0073             01,2223 10 340 1           CCS    VAC2USE
 0074             01,2224  1 2234 1          TCF    VACFOUND
 0075             01,2225 10 414 1           CCS    VAC3USE
 0076             01,2226  1 2234 1          TCF    VACFOUND
 0077             01,2227 10 470 0           CCS    VAC4USE
 0078             01,2230  1 2234 1          TCF    VACFOUND
 0079             01,2231 10 544 0           CCS    VAC5USE
 0080             01,2232  1 2234 1          TCF    VACFOUND
 0081             01,2233  0 2233 1          TC                     ABORT IF NO VAC AREAS AVAILABLE.

 0082             01,2234  6 7645 1 VACFOUND AD     TWO             RESERVE THIS VAC AREA BY STORING A ZERO
 0083             01,2235 22 007 0           ZL                     IN ITS VAC USE REGISTER AND STORE THE
 0084             01,2236 50 000 1           INDEX  A               ADDRESS OF THE FIRST WORD OF IT IN THE
 0085             01,2237 21 777 0           LXCH   0 -1            LOW NINE BITS OF THE PRIORITY WORD.
 0086             01,2240 26 632 1           ADS    NEWPRIO

 0087             01,2241  3 7653 0 NOVAC2   CAF    ZERO            NOVAC ENTERS HERE. FIND A CORE SET.
 0088             01,2242 54 635 0           TS     LOCCTR
 0089             01,2243  3 2250 1          CAF    NO.CORES        SEVEN SETS OF ELEVEN REGISTERS EACH.
 0090             01,2244 54 627 0  NOVAC3   TS     EXECTEM2
 0091             01,2245 50 635 1           INDEX  LOCCTR
 0092             01,2246 10 153 1           CCS    PRIORITY        EACH PRIORITY REGISTER CONTAINS -0 IF
 0093             01,2247  1 2310 0          TCF    NEXTCORE        THE CORRESPONDING CORE SET IS AVAILABLE.
 0094             01,2250   00006 1 NO.CORES DEC    6
 0095             01,2251  1 2310 0          TCF    NEXTCORE        AN ACTIVE JOB HAS A POSITIVE PRIORITY
A0096                                                               BUT A DORMANT JOB'S PRIORITY IS NEGATIVE
```

```
        EXECUTIVE                                                                      USER'S OWN PAGE NO.   4

0097                          01,2252  3 0632 0  CORFOUND CA       NEWPRIO            SET THE PRIORITY OF THIS JOB IN THE CORE
0098                          01,2253  50 635 1           INDEX    LOCCTR             SET'S PRIORITY REGISTER AND SET THE
0099                          01,2254  54 153 1           TS       PRIORITY           JOB'S PUSH-DOWN POINTER AT THE BEGINNING
0100                          01,2255  7 2503 1           MASK     LOW9               OF THE WORK AREA AND OVERFLOW INDICATOR
0101                          01,2256  50 635 1           INDEX    LOCCTR
0102                          01,2257  54 152 0           TS       PUSHLOC            OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

0103                          01,2260  10 635 0           CCS      LOCCTR             IF CORE SET ZERO IS BEING LOADED, SET UP
0104                          01,2261  1 2275 1           TCF      SETLOC             OVFIND AND FIXLOC IMMEDIATELY .
0105                          01,2262  54 105 1           TS       OVFIND
0106                          01,2263  3 0152 1           CA       PUSHLOC
0107                          01,2264  54 104 0           TS       FIXLOC

01071                         01,2265  10 067 1  SPECTEST CCS      NEWJOB             SEE IF ANY ACTIVE JOBS WAITING (RARE).
01072                         01,2266  1 2275 1           TCF      SETLOC             MUST BE AWAKENED BUT UNCHANGED JOB.
01073                                   01,2271           SETLOC +2
01074                         01,2271  54 067 1           TS       NEWJOB             +0 SHOWS ACTIVE JOB ALREADY SET.
01075                         01,2272  52 634 1           DXCH     NEWLOC
01076                         01,2273  52 151 0           DXCH     LOC
01077                         01,2274  1 4210 1           TCF      ENDFIND

0108                          01,2275  52 634 1  SETLOC   DXCH     NEWLOC             SET UP THE LOCATION REGISTERS FOR THIS
0109                          01,2276  50 635 1           INDEX    LOCCTR
0110                          01,2277  52 151 0           DXCH     LOC
0111                          01,2300  50 067 0           INDEX    NEWJOB             THIS INDEX INSTRUCTION INSURES THAT THE
0112                          01,2301  4 0153 1           CS       PRIORITY           HIGHEST ACTIVE PRIORITY WILL BE COMPARED
0113                          01,2302  6 0632 0           AD       NEWPRIO            WITH THE NEW PRIORITY TO SEE IF NEWJOB
0114                          01,2303  0 0006 1           EXTEND                      SHOULD BE SET TO SIGNAL A SWITCH.
0115                          01,2304  6 4210 0           BZMF     ENDFIND
0116                          01,2305  3 0635 1           CA       LOCCTR             LOCCTR IS LEFT SET AT THIS CORE SET IF
0117                          01,2306  54 067 1           TS       NEWJOB             THE CALLER WANTS TO LOAD ANY MPAC
0118                          01,2307  1 4210 1           TCF      ENDFIND            REGISTERS, ETC.

0119                          01,2310  3 2416 0  NEXTCORE CAF      COREINC
0120                          01,2311  26 635 0           ADS      LOCCTR
0121                          01,2312  10 627 0           CCS      EXECTEM2
0122                          01,2313  1 2244 0           TCF      NOVAC3
0123                          01,2314  0 2314 0           TC                          ABORT IF NO MORE CORE SETS.
```

```
P0124            THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

 0126                    01,2315  52 151 0   -1       DXCH   LOC
 0127                    01,2316  50 067 0  CHANJOB   INDEX  NEWJOB           LOC ARRIVES IN A AND BBANK IN L.
 0128                    01,2317  52 151 0            DXCH   LOC
 0129                    01,2320  52 151 0            DXCH   LOC

 0130                    01,2321  52 141 1            DXCH   MPAC             SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
 0131                    01,2322  50 067 0            INDEX  NEWJOB
 0132                    01,2323  52 141 1            DXCH   MPAC
 0133                    01,2324  52 141 1            DXCH   MPAC
 0134                    01,2325  52 143 0            DXCH   MPAC +2
 0135                    01,2326  50 067 0            INDEX  NEWJOB
 0136                    01,2327  52 143 0            DXCH   MPAC +2
 0137                    01,2330  52 143 0            DXCH   MPAC +2
 0138                    01,2331  52 145 0            DXCH   MPAC +4
 0139                    01,2332  50 067 0            INDEX  NEWJOB
 0140                    01,2333  52 145 0            DXCH   MPAC +4
 0141                    01,2334  52 145 0            DXCH   MPAC +4
 0142                    01,2335  52 147 1            DXCH   MPAC +6
 0143                    01,2336  50 067 0            INDEX  NEWJOB
 0144                    01,2337  52 147 1            DXCH   MPAC +6
 0145                    01,2340  52 147 1            DXCH   MPAC +6

 0146                    01,2341  3 7653 0            CAF    ZERO
 0148                    01,2342  56 105 0            XCH    OVFIND           MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
 0149                    01,2343  0 0006 1            EXTEND
 0150                    01,2344  1 2347 1            BZF    +3
 0151                    01,2345  4 0152 0            CS     PUSHLOC
 0152                    01,2346  54 152 0            TS     PUSHLOC

 0153                    01,2347  52 153 1            DXCH   PUSHLOC
 0154                    01,2350  50 067 0            INDEX  NEWJOB
 0155                    01,2351  52 153 1            DXCH   PUSHLOC
 0156                    01,2352  52 153 1            DXCH   PUSHLOC          SWAPS PUSHLOC AND PRIORITY.
 0157                    01,2353  10 152 0            CCS    PUSHLOC          SET OVERFLOW INDICATOR ACCORDING TO
 0158                    01,2354  3 7653 0            CAF    ZERO
 0159                    01,2355  1 2362 0            TCF    ENDPRCHG -1
 0160                    01,2356  4 0152 0            CS     PUSHLOC
 0161                    01,2357  54 152 0            TS     PUSHLOC
 0162                    01,2360  3 7646 1            CAF    ONE
 0163                    01,2361  56 105 0            XCH    OVFIND
 0164                    01,2362  54 067 1            TS     NEWJOB

 01645                   01,2363  0 0003 1  ENDPRCHG  RELINT
 0165                    01,2364  52 151 0            DXCH   LOC              BASIC JOBS HAVE POSITIVE ADDRESSES, SO
 0166                    01,2365  0 0006 1            EXTEND                  DISPATCH WITH A DTCB.
 0167                    01,2366  6 2370 1            BZMF   +2               IF INTERPRETIVE, SET UP EBANK, ETC.
 0168                    01,2367  52 006 0            DTCB
```

```
0169                  01,2370  4 0000 0            COM                  EPILOGUE TO JOB CHANGE FOR INTERPRETIVE
0170                  01,2371  54 150 1            TS      LOC          RESUME.
0171                  01,2372  3 6232 1            CAF     FBANKMSK
0172                  01,2373  7 0001 1            MASK    L
0173                  01,2374  1 6011 0            TCF     INTRSM

R0174        COMPLETE JOBSLEEP PREPARATIONS.

0175                  01,2375  0 0004 0  JOBSLP1   INHINT
0176                  01,2376  4 0153 1            CS      PRIORITY     NNZ PRIORITY SHOWS JOB ASLEEP.
0177                  01,2377  54 153 1            TS      PRIORITY
0178                  01,2400  3 6027 1            CAF     LOW7
0179                  01,2401  7 0006 0            MASK    BBANK
0180                  01,2402  54 151 0            TS      BANKSET
01803                 01,2403  4 7653 1            CS      ZERO
01806                 01,2404  54 115 0  JOBSLP2   TS      BUF +1       HOLDS - HIGHEST PRIORITY.
0181                  01,2405  1 2475 1            TCF     EJSCAN       SCAN FOR HIGHEST PRIORITY ALA ENDOFJOB.
```

```
P0182          TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE FCADR IN THE
R0184   LOC REGISTER OF ANY SUCH JOB MATCHES THAT SUPPLIED BY THE CALLER, THAT JOB IS AWAKENED. IF NO JOB IS FOUND,
R0186   LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

 0187                  01,2406  54 626 1  JOBWAKE2 TS      EXECTEM1
 0188                  01,2407  3 7653 0           CAF     ZERO               BEGIN CORE SET SCAN.
 0189                  01,2410  54 635 0           TS      LOCCTR
 0190                  01,2411  3 2250 1           CAF     NO.CORES
 0191                  01,2412  54 627 0  JOBWAKE4 TS      EXECTEM2
 0192                  01,2413  50 635 1           INDEX   LOCCTR
 0193                  01,2414  10 153 1           CCS     PRIORITY
 0194                  01,2415  1 2420 1           TCF     JOBWAKE3           ACTIVE JOB - CHECK NEXT CORE SET.
 0195                  01,2416   00014 1  COREINC  DEC     12                 12 REGISTERS PER CORE SET.
 0196                  01,2417  1 2427 0           TCF     WAKETEST           SLEEPING JOB - SEE IF CADR MATCHES.

 0197                  01,2420  3 2416 0  JOBWAKE3 CAF     COREINC
 0198                  01,2421  26 635 0           ADS     LOCCTR
 0199                  01,2422  10 627 0           CCS     EXECTEM2
 0200                  01,2423  1 2412 0           TCF     JOBWAKE4
 0201                  01,2424  4 7646 0           CS      ONE                EXIT IF SLEEPING JOB NOT FOUND.
 0202                  01,2425  54 635 0           TS      LOCCTR
 0203                  01,2426  1 4210 1           TCF     ENDFIND

 0204                  01,2427  4 0633 0  WAKETEST CS      NEWLOC
 0205                  01,2430  50 635 1           INDEX   LOCCTR
 0206                  01,2431  6 0150 0           AD      LOC
 0207                  01,2432  0 0006 1           EXTEND
 0208                  01,2433  1 2435 0           BZF     +2                 IF MATCH.
 0209                  01,2434  1 2420 1           TCF     JOBWAKE3           EXAMINE NEXT CORE SET IF NO MATCH.

 0210                  01,2435  50 635 1           INDEX   LOCCTR             RE-COMPLEMENT PRIORITY TO SHOW JOB AWAKE
 0211                  01,2436  4 0153 1           CS      PRIORITY
 0212                  01,2437  50 635 1           INDEX   LOCCTR
 0213                  01,2440  54 153 1           TS      PRIORITY

 0214                  01,2441  4 6232 0           CS      FBANKMSK           MAKE UP THE 2CADR OF THE WAKE ADDRESS
 0215                  01,2442  7 0633 0           MASK    NEWLOC             USING THE CADR IN NEWLOC AND THE EBANK
 0216                  01,2443  6 7634 1           AD      2K                 HALF OF BBANK SAVED IN BANKSET.
 0217                  01,2444  56 633 1           XCH     NEWLOC
 0218                  01,2445  7 6232 0           MASK    FBANKMSK
 0219                  01,2446  50 635 1           INDEX   LOCCTR
 0220                  01,2447  6 0151 1           AD      BANKSET
 0221                  01,2450  54 634 1           TS      NEWLOC +1

 0222                  01,2451  10 635 0           CCS     LOCCTR             SPECIAL TREATMENT IF THIS JOB WAS
 02222                 01,2452  1 2275 1           TCF     SETLOC             ALREADY IN THE RUN (0) POSITION.
 02224                 01,2453  1 2265 0           TCF     SPECTEST
```

```
P0223            PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

 0225                          01,2454  54 150 1  PRIOCH2  TS      LOC
 02253                         01,2455  3 7653 0           CAF     ZERO           SET FLAG TO TELL ENDJOB SCANNER IF THIS
 02256                         01,2456  54 114 1           TS      BUF            JOB IS STILL HIGHEST PRIORITY.
 0226                          01,2457  3 2503 0           CAF     LOW9
 0227                          01,2460  7 0153 1           MASK    PRIORITY
 0228                          01,2461  6 0632 0           AD      NEWPRIO
 0229                          01,2462  54 153 1           TS      PRIORITY
 0230                          01,2463  4 0000 0           COM
 0231                          01,2464  1 2404 1           TCF     JOBSLP2        AND TO EJSCAN.
```

```
P0239             RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

 0241                       01,2465  0 0004 0  ENDJOB1   INHINT
 0242                       01,2466  4 7653 1            CS        ZERO
 02425                      01,2467  54 115 0            TS        BUF +1
 0243                       01,2470  56 153 0            XCH       PRIORITY
 0244                       01,2471  7 2503 1            MASK      LOW9
 0245                       01,2472  10 000 0            CCS       A
 0246                       01,2473  50 000 1            INDEX     A
 0247                       01,2474  54 000 0            TS        0

 0248                       01,2475  10 167 0  EJSCAN    CCS       PRIORITY +12D
 02485                      01,2476  0 2542 0            TC        EJ1
 0249                                  01,2500           SETLOC    +1
 02495                      01,2500  1 2501 0            TCF       +1

 0250                       01,2501  10 203 1            CCS       PRIORITY +24D    EXAMINE EACH PRIORITY REGISTER TO FIND
 0251                       01,2502  0 2542 0            TC        EJ1              THE JOB OF HIGHEST ACTIVE PRIORITY.
 0252                       01,2503   00777 0  LOW9      OCT       00777
 0253                       01,2504  1 2505 1            TCF       +1

 0254                       01,2505  10 217 1            CCS       PRIORITY +36D
 0255                       01,2506  0 2542 0            TC        EJ1
 0256                       01,2507  67 624 0  -CCSPR   -CCS       PRIORITY
 0257                       01,2510  1 2511 1            TCF       +1

 0258                       01,2511  10 233 1            CCS       PRIORITY +48D
 0259                       01,2512  0 2542 0            TC        EJ1
 0260                                  01,2514           SETLOC    +1
 0261                       01,2514  1 2515 0            TCF       +1

 0262                       01,2515  10 247 1            CCS       PRIORITY +60D
 0263                       01,2516  0 2542 0            TC        EJ1
 0264                                  01,2520           SETLOC    +1
 0265                       01,2520  1 2521 1            TCF       +1

 0266                       01,2521  10 263 1            CCS       PRIORITY +72D
 0267                       01,2522  0 2542 0            TC        EJ1
 0268                                  01,2524           SETLOC    +1
 0269                       01,2524  1 2525 0            TCF       +1
```

```
P0270           EVALUATE THE RESULTS OF THE SCAN.

 0271                    01,2525  10 115 0          CCS     BUF +1         SEE IF THERE ARE ANY ACTIVE JOBS WAITING
 0272                              01,2530          SETLOC  +2
 02725                   01,2530  1 2532 0          TCF     +2
 0273                    01,2531  1 4215 1          TCF     DUMMYJOB
 0274                    01,2532  10 114 1          CCS     BUF            BUF IS ZERO IF THIS IS A PRIOCHNG AND
 0275                    01,2533  1 2535 1          TCF     +2             CHANGED PRIORITY IS STILL HIGHEST.
 0276                    01,2534  1 2363 1          TCF     ENDPRCHG

 0277                    01,2535  50 000 1          INDEX   A              OTHERWISE, SET NEWJOB TO THE RELATIVE
 0278                    01,2536  2'7777 0          CAF     0 -1           ADDRESS OF THE NEW JOB'S CORE SET.
 0279                    01,2537  6 2507 1          AD      -CCSPR
 0280                    01,2540  54 067 1          TS      NEWJOB
 0281                    01,2541  1 2315 0          TCF     CHANJOB -1

 0282                    01,2542  54 116 0  EJ1     TS      BUF +2
 0283                    01,2543  6 0115 1          AD      BUF +1         - OLD HIGH PRIORITY.
 0284                    01,2544  10 000 0          CCS     A
 0285                    01,2545  4 0116 0          CS      BUF +2
 0286                    01,2546  1 2552 0          TCF     EJ2            NEW HIGH PRIORITY.
 0287                    01,2547  1 2550 1          NOOP
 0288                    01,2550  50 002 0          INDEX   Q
 0289                    01,2551  0 0002 0          TC      2              PROCEED WITH SEARCH.

 0290                    01,2552  54 115 0  EJ2     TS      BUF +1
 0291                    01,2553  0 0006 1          EXTEND
 0292                    01,2554  22 114 0          DXCH    BUF            FOR LOCATING CCS PRIORITY + X INSTR.
 0293                    01,2555  50 114 0          INDEX   BUF
 0294                    01,2556  0 0002 0          TC      2

 02945                     01,2557  ENDEXECS EQUALS
```

```
P0295          IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF,
R0297    BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

02975                            4215           SETLOC EXECBANK +1

0298                   4215   4 7653 1 DUMMYJOB CS     ZERO             SET NEWJOB TO -0 FOR IDLING.
0299                   4216  54 067 1           TS     NEWJOB
0300                   4217   0 0003 1          RELINT
0301                   4220   4 7645 0          CS     TWO              TURN OFF THE ACTIVITY LIGHT.
0302                   4221   0 0006 1          EXTEND
0303                   4222  03 011 1           WAND   DSALMOUT
03031                  4223   1 4226 1          TCF    CHECKNJ +2

03032                  4224   0 0006 1 CHECKNJ  EXTEND                  SPECIAL NEWJOB TEST FOR SELF-CHECK,
03033                  4225  23'043 1           QXCH   SELFRET          WHICH RUNS UNDER EXECUTIVE CONTROL,
0304                   4226  10 067 1   +2      CCS    NEWJOB           BUT DOES NOT HAVE A JOBS CORE REGISTERS.
0305                   4227   1 4241 0          TCF    NUCHANGE         NEW JOB REQUIRING A CHANGE JOB.
0306                   4230   3 7645 1          CAF    TWO              NEW JOB ALREADY IN POSITION FOR
0307                   4231   1 4235 0          TCF    NUDIRECT         EXECUTION.

0308                   4232   3 4250 1          CAF    SELFBANK         RETURN TO SELF-CHECK.
03081                  4233  54 004 1           TS     FBANK
03082                  4234   0 1043 1          TC     SELFRET

0309                   4235   0 0006 1 NUDIRECT EXTEND                  TURN THE GREEN LIGHT BACK ON.
0310                   4236  05 011 1           WOR    DSALMOUT
0311                   4237  52 151 0           DXCH   LOC              JOBS STARTED IN THIS FASHION MUST BE
0312                   4240  52 006 0           DTCB                    BASIC.

0313                   4241   3 7645 1 NUCHANGE CAF    TWO
0314                   4242   0 0006 1          EXTEND
0315                   4243  05 011 1           WOR    DSALMOUT
03153                  4244   3 4214 1          CAF    EXECBANK         SWAP CORE SETS.
03156                  4245  54 004 1           TS     FBANK
0316                   4246   0 0004 0          INHINT                  CHANGE JOBS
0317                   4247   1 2315 0          TCF    CHANJOB -1

03175                  4250    21271 0 SELFBANK CADR   ENDEDOP
0318                             4251  ENDEXECF EQUALS
```

```
        WAITLIST                                                                USER'S OWN PAGE NO.   1

R0001   GROUNDRULE....DELTA T SHOULD NOT EXCEED 12000 (= 2 MINUTES)

 0002                              4251             SETLOC ENDEXECF

 0003                                E3             EBANK= LST1                 TASK  LISTS IN SWITCHED E BANK.

 0004                     4251  56 002 0  WAITLIST XCH    Q                      SAVE DELTA T IN Q AND RETURN IN
 0005                     4252  54 624 0           TS     WAITEXIT              WAITEXIT.
 0006                     4253  0 0006 1           EXTEND
 0007                     4254  5 0000 1           INDEX  A
 0008                     4255  3 0001 0           DCA    0                     PICK UP 2CADR OF TASK.
 0009                     4256  54 630 0           TS     WAITADR               BBCON WILL REMAIN IN L.
 0010                     4257  3 4266 1           CAF    WAITBB
 0011                     4260  56 006 1           XCH    BBANK
 0012                     4261  1 2557 0           TCF    WAIT2

R0013           RETURN TO CALLER AFTER TASK INSERTION:

 0014                     4262  3 0625 0  LVWTLIST CA     WAITBANK
 0015                     4263  54 006 0           TS     BBANK
 0016                     4264  50 624 1           INDEX  WAITEXIT
 0017                     4265  0 0002 0           TC     2

 0018                     4266   02003 0  WAITBB   BBCON  WAIT2

R0019   ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADRES ALONE.

 0021                     4267   73506 0  ENDTASK  -2CADR SVCT3
C0021                     4270   73774 1
 0022                     4271  1 4321 1  SVCT3    TCF    TASKOVER
```

```
P0023           BEGIN TASK INSERTION.

 0024                        01,2557             SETLOC ENDEXECS

 0025                   01,2557  54 625 1  WAIT2    TS      WAITBANK          BBANK OF CALLING PROGRAM.
 0026                   01,2560   4 0026 1          CS      TIME3
 0027                   01,2561   6 2562 1          AD      +1                CCS  A   = + 1/4
 0028                   01,2562  10 000 0          CCS     A                 TEST  1/4 - C(TIME3).  IF POSITIVE,
A0029                                      IT MEANS THAT TIME3 OVERFLOW HAS OCCURRED PRIOR TO CS  TIME3 AND THAT
A0030                                      C(TIME3) = T - T1, INSTEAD OF 1.0 - (T1 - T).  THE FOLLOWING FOUR
A0031                                      ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.

 0032                   01,2563   6 6042 1          AD      OCT40001          OVERFLOW HAS OCCURRED.  SET C(A) =
 0033                   01,2564   4 0000 0          CS      A                 T - T1 + 3/4 - 1

R0034     NORMAL CASE (C(A) MINUS) YIELDS SAME C(A)  -(-(1.0-(T1-T))+1/4)-1

 0035                   01,2565   6 2657 1          AD      OCT50001
 0036                   01,2566   6 0002 0          AD      Q                 RESULT = TD - T1 + 1.

 0037                   01,2567  10 000 0          CCS     A                 TEST TD - T1 + 1

 0038                   01,2570   6 1400 1          AD      LST1              IF TD - T1 POS, GO TO WTLST5 WITH
 0039                   01,2571   1 2625 0          TCF     WTLST5            C(A) = (TD - T1) + C(LST1) = TD-T2+1

 0040                   01,2572   1 2573 0          NOOP
 0041                   01,2573   4 0002 1          CS      Q

R0042     NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -1,
R0043     SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1 .  (G/E
R0044     SYMBOL MEANS GREATER THAN OR EQUAL TO).  THUS THERE NEED BE NO CON-
R0045     CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.

 0046                   01,2574   6 7631 1          AD      POS1/2            WHEN TD IS NEXT, FORM QUANTITY
 0047                   01,2575   6 7631 1          AD      POS1/2              1.0 - DELTA T = 1.0 - (TD - T)
 0048                   01,2576  56 026 0          XCH     TIME3
 0049                   01,2577   6 7630 0          AD      NEGMAX
 0050                   01,2600   6 0002 0          AD      Q                 1.0 - DELTAT T NOW COMPLETE.
 0051                   01,2601   0 0006 1          EXTEND                    ZERO INDEX Q.
 0052                   01,2602  22 007 0          QXCH    7                 (ZQ)
 0053                       01,2603  57'400 1  WTLST4    XCH     LST1
 0054                       01,2604  57'401 0            XCH     LST1 +1
 0055                       01,2605  57'402 0            XCH     LST1 +2
 0056                       01,2606  57'403 1            XCH     LST1 +3
 0057                       01,2607  57'404 0            XCH     LST1 +4

 0058                       01,2610  3 0630 1            CA      WAITADR        (MINOR PART OF TASK CADR HAS BEEN IN L.)
 0059                       01,2611  50 002 0            INDEX   Q
 0060                       01,2612  1 2613 0            TCF     +1

 0061                       01,2613  53'406 0            DXCH    LST2
 0062                       01,2614  53'410 1            DXCH    LST2 +2
 0063                       01,2615  53'412 0            DXCH    LST2 +4
 0064                       01,2616  53'414 0            DXCH    LST2 +6
 0065                       01,2617  53'416 1            DXCH    LST2 +8D
 0066                       01,2620  53'420 1            DXCH    LST2 +10D      AT END, CHECK THAT C(LST2+10) IS STD
 0067                       01,2621  6 4267 0            AD      ENDTASK          END ITEM, AS CHECK FOR EXCEEDING
A0068                                                                             THE LENGTH OF THE LIST.
 0069                       01,2622  0 0006 1            EXTEND                 DUMMY TASK ADRES SHOULD BE IN FIXED-
 0070                       01,2623  1 4262 1            BZF     LVWTLIST       FIXED SO ITS ADRES ALONE DISTINGUISHES
 0071                       01,2624  1 2663 1            TCF     WTABORT        IT.
```

```
01,2625  10 000 0  WTLST5    CCS     A              TEST  TD - T2 + 1
01,2626  6 1401 0            AD      LST1 +1
01,2627  1 2633 1            TCF     +4
01,2630  6 7646 1            AD      ONE
01,2631  0 2664 1            TC      WTLST2
01,2632   00001 0            OCT     1

01,2633  10 000 0  +4        CCS     A              TEST  TD - T3 + 1
01,2634  6 1402 0            AD      LST1 +2
01,2635  1 2641 1            TCF     +4
01,2636  6 7646 1            AD      ONE
01,2637  0 2664 1            TC      WTLST2
01,2640   00002 0            OCT     2

01,2641  10 000 0  +4        CCS     A              TEST  TD - T4 + 1
01,2642  6 1403 1            AD      LST1 +3
01,2643  1 2647 1            TCF     +4
01,2644  6 7646 1            AD      ONE
01,2645  0 2664 1            TC      WTLST2
01,2646   00003 1            OCT     3

01,2647  10 000 0  +4        CCS     A              TEST  TD - T5 + 1
01,2650  6 1404 0            AD      LST1 +4
01,2651  1 2655 1            TCF     +4
01,2652  6 7646 1            AD      ONE
01,2653  0 2664 1            TC      WTLST2
01,2654   00004 0            OCT     4

01,2655  10 000 0  +4        CCS     A              TEST  TD - T6 + 1
01,2656  1 2663 1            TCF     WTABORT
01,2657   50001 0  OCT50001  OCT     50001
01,2660  6 7646 1            AD      ONE
01,2661  0 2664 1            TC      WTLST2
01,2662   00005 1            OCT     5

01,2663  0 2663 0  WTABORT   TC                     LIST OVERFLOW.
```

```
P0103    THE ENTRY TO WTLST2 JUST PRECEDING OCT  N  IS FOR T  LE TD LE T    -1.
R0104                                                      N           N+1

R0105    (LE MEANS LESS THAN OR EQUAL TO).  AT ENTRY, C(A) = -(TD - T    + 1)
R0106                                                               N+1

R0107    THE LST1 ENTRY -(T    - T +1) IS TO BE REPLACED BY -(TD - T + 1), AND
R0108                     N+1   N                                N

R0109    THE ENTRY -(T    - TD + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.
R0110                N+1

 0111                        01,2664  54 631 1  WTLST2    TS      WAITTEMP            C(A) = -(TD - T    + 1)
 0112                        01,2665  50 002 0            INDEX   Q
 0113                        01,2666  3 0000 1            CAF     0
 0114                        01,2667  54 002 1            TS      Q                INDEX VALUE INTO Q.

 0115                        01,2670  3 7646 1            CAF     ONE
 0116                        01,2671  6 0631 0            AD      WAITTEMP
 0117                        01,2672  50 002 0            INDEX   Q                C(A) = -(TD - T ) + 1.
 0118                        01,2673  27'377 1            ADS     LST1 -1                          N

 0119                        01,2674  4 0631 1            CS      WAITTEMP
 0120                        01,2675  50 002 0            INDEX   Q
 0121                        01,2676  1 2603 1            TCF     WTLST4

 0122                                 01,2677  ENDWAITS EQUALS                     LAST SWITCHABLE LOCATION.

R0123    C(TIME3) = 1.0 - (T1 - T)

R0124    C(LST1  ) = - (T2 - T1) + 1
R0125    C(LST1+1) = - (T3 - T2) + 1
R0126    C(LST1+2) = - (T4 - T3) + 1
R0127    C(LST1+3) = - (T5 - T4) + 1
R0128    C(LST1+4) = - (T6 - T5) + 1

R0129    C(LST2   ) = 2CADR  TASK1
R0130    C(LST2+2 ) = 2CADR  TASK2
R0131    C(LST2+4 ) = 2CADR  TASK3
R0132    C(LST2+6 ) = 2CADR  TASK4
R0133    C(LST2+8 ) = 2CADR  TASK5
R0134    C(LST2+10) = 2CADR  TASK6
```

```
          ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

                              4272              SETLOC SVCT3 +1

                      4272  54 016 1  T3RUPT    TS     BANKRUPT
                      4273  0 0006 1            EXTEND
                      4274  22 012 1            QXCH   QRUPT

                      4275  3 7627 0  T3RUPT2   CAF    NEG1/2          DISPATCH WAITLIST TASK.
                      4276  57'404 0            XCH    LST1 +4         1.  MOVE UP LST1 CONTENTS, ENTERING
                      4277  57'403 1            XCH    LST1 +3             A VALUE OF 1/2 +1 AT THE BOTTOM
                      4300  57'402 0            XCH    LST1 +2             FOR T6-T5, CORRESPONDING TO THE
                      4301  57'401 0            XCH    LST1 +1             INTERVAL 81.91 SEC FOR ENDTASK.
                      4302  57'400 1            XCH    LST1
                      4303  6 7626 1            AD     POSMAX          2. SET T3 = 1.0 - T2 -T USING LIST 1.
                      4304  26 026 1            ADS    TIME3           SO T3 WONT TICK DURING UPDATE.
                      4305  54 636 0            TS     RUPTAGN
                      4306  4 7653 1            CS     ZERO
                      4307  54 636 0            TS     RUPTAGN         SETS RUPTAGN TO +1 ON OVERFLOW.

                      4310  0 0006 1            EXTEND                 DISPATCH TASK.
                      4311  4 4270 1            DCS    ENDTASK
                      4312  53'420 1            DXCH   LST2 +10D
                      4313  53'416 1            DXCH   LST2 +8D
                      4314  53'414 0            DXCH   LST2 +6
                      4315  53'412 0            DXCH   LST2 +4
                      4316  53'410 1            DXCH   LST2 +2
                      4317  53'406 0            DXCH   LST2

                      4320  52 006 0            DTCB


RETURN, AFTER EXECUTION OF TIME3 OVERFLOW TASK.

                      4321  10 636 0  TASKOVER  CCS    RUPTAGN         IF +1 RETURN TO T3RUPT, IF -0 RESUME.
                      4322  3 4266 1            CAF    WAITBB
                      4323  54 006 0            TS     BBANK
                      4324  1 4275 1            TCF    T3RUPT2         DISPATCH NEXT TASK IF IT WAS DUE.

                      4325  0 0006 1  RESUME    EXTEND
                      4326  22 012 1            QXCH   QRUPT
                      4327  3 0016 0            CA     BANKRUPT
                      4330  54 006 0            TS     BBANK
                      4331  52 011 0            DXCH   ARUPT
                      4332  50 017 1            RESUME

                              4333  ENDWAITF    EQUALS                 LAST FIXED-FIXED LOCATION OF T3RUPT.
```

```
       FRESH START AND RESTART                                                      USER'S OWN PAGE NO.   1

 0001                         01,2677             SETLOC ENDWAITS

 0002               01,2677  0 0004 0  SLAP1     INHINT                         FRESH START. COMES HERE FROM PINBALL.
 0003               01,2700  3 7653 0            CAF     ZERO                    (ZERO FAILREG IN FRESH START ONLY).
 0004               01,2701  54 721 1            TS      FAILREG
 0005               01,2702  54 715 0            TS      UPLOCK                 FREE UPLINK INTERLOCK
 00051              01,2703  3 7630 0            CAF     BIT15                  TURNS OFF AUTO, HOLD, FREE, NO ATT,
 00052              01,2704  54 675 1            TS      DSPTAB  +11D           SPARE, GIMBAL LOCK, SPARE, TRACKER,
A00053                                                                          PROG ALM (BITS 1-9 OF DSPTAB+11D),
A00054                                                                          IN FRESH START ONLY.
 00055              01,2705  4 7632 0            CS      BIT13                  TURN OFF :TEST ALARM: OUTBIT (CHAN13
 00056              01,2706  0 0006 1            EXTEND                         BIT10).  FRESH START ONLY.
 00057              01,2707  03 013 0            WAND    CHAN13
 000571             01,2710  4 7643 0            CS      BIT4                   TURN OFF TEMP (FRESH START ONLY)
 000572             01,2711  0 0006 1            EXTEND
 000573             01,2712  03 011 1            WAND    DSALMOUT
 00058              01,2713  3 2722 1            CAF     STARTEB
 00059              01,2714  54 003 0            TS      EBANK                  SET FOR E3
 0006               01,2715  3 7653 0  SLAP2     CAF     ZERO
 0007               01,2716  55'047 1            TS      SMODE
 0008               01,2717  0 2723 0            TC      STARTSUB               SUBROUTINE DOES MOST OF THE WORK.

 0009               01,2720  1 4215 1            TCF     DUMMYJOB

 0010               01,2721  0 2715 0  GOPROG    TC      SLAP2                  COMES HERE FROM 4050  RESTART.



 00101                              E3           EBANK=  LST1
 00102              01,2722   01400 1  STARTEB   ECADR   LST1
 0011               01,2723  56 002 0  STARTSUB  XCH     Q
 0012               01,2724  54 114 1            TS      BUF                    EXEC TEMPS ARE AVAILABLE TO US.

 0013               01,2725  3 7626 1            CAF     POSMAX                 T3 AND T4 OVERFLOW AS SOON AS POSSIBLE.
 0014               01,2726  54 026 1            TS      TIME3                   (POSMAX IS PSEUDO INTERRUPT SIGNAL IN
 0015               01,2727  54 027 0            TS      TIME4                    CASE RUPT SIGNALLED BEFORE TS TIME3).

 0016               01,2730  3 7627 0            CAF     NEG1/2                 INITIALIZE WAITLIST DELTA-TS.
 0017               01,2731  55'404 1            TS      LST1   +4
 0018               01,2732  55'403 0            TS      LST1   +3
 0019               01,2733  55'402 1            TS      LST1   +2
 0020               01,2734  55'401 1            TS      LST1   +1
 0021               01,2735  55'400 0            TS      LST1

 0022               01,2736  4 4267 1            CS      ENDTASK
 0023               01,2737  55'405 0            TS      LST2
 0024               01,2740  55'407 1            TS      LST2 +2
 0025               01,2741  55'411 0            TS      LST2 +4
 0026               01,2742  55'413 1            TS      LST2 +6
 0027               01,2743  55'415 1            TS      LST2 +8D
```

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         FRESH START AND RESTART                                                             USER'S OWN PAGE NO.   2

  0028                          01,2744  55'417 0            TS     LST2 +10D
  0029                          01,2745  4 4270 1            CS     ENDTASK +1
  0030                          01,2746  55'406 0            TS     LST2 +1
  0031                          01,2747  55'410 1            TS     LST2 +3
  0032                          01,2750  55'412 0            TS     LST2 +5
  0033                          01,2751  55'414 0            TS     LST2 +7
  0034                          01,2752  55'416 1            TS     LST2 +9D
  0035                          01,2753  55'420 1            TS     LST2 +11D

  0036                          01,2754  4 7653 1            CS     ZERO               MAKE ALL EXECUTIVE REGISTER SETS
  0037                          01,2755  54 153 1            TS     PRIORITY           AVAILABLE.
  0038                          01,2756  54 167 0            TS     PRIORITY +12D
  0039                          01,2757  54 203 1            TS     PRIORITY +24D
  0040                          01,2760  54 217 1            TS     PRIORITY +36D
  0041                          01,2761  54 233 1            TS     PRIORITY +48D
  0042                          01,2762  54 247 1            TS     PRIORITY +60D
  0043                          01,2763  54 263 1            TS     PRIORITY +72D

  00435                         01,2764  54 067 1            TS     NEWJOB             SHOWS NO ACTIVE JOBS.

  0044                          01,2765  3 3050 1            CAF    VAC1ADRC           MAKE ALL VAC AREAS AVAILABLE.
  0045                          01,2766  54 264 0            TS     VAC1USE
  0046                          01,2767  6 3051 0            AD     LTHVACA
  0047                          01,2770  54 340 1            TS     VAC2USE
  0048                          01,2771  6 3051 0            AD     LTHVACA
  0049                          01,2772  54 414 1            TS     VAC3USE
  0050                          01,2773  6 3051 0            AD     LTHVACA
  0051                          01,2774  54 470 0            TS     VAC4USE
  0052                          01,2775  6 3051 0            AD     LTHVACA
  0053                          01,2776  54 544 0            TS     VAC5USE

  0054                          01,2777  3 7646 1            CAF    ONE                GIVES 110 MS TO GET READY FOR T4.
  0055                          01,3000  55'020 0            TS     DSRUPTSW
  0056                          01,3001  3 7650 0            CAF    TEN                TURN OFF ALL DISPLAY SYSTEM RELAYS.
  0057                          01,3002  54 140 0   DSPOFF   TS     MPAC
  0058                          01,3003  4 7633 1            CS     BIT12
  0059                          01,3004  50 140 1            INDEX  MPAC
  0060                          01,3005  54 662 1            TS     DSPTAB
  0061                          01,3006  10 140 0            CCS    MPAC
  0062                          01,3007  0 3002 0            TC     DSPOFF

  0063                          01,3010  54 045 1            TS     INLINK
  0064                          01,3011  54 714 1            TS     DSPCNT
  0066                          01,3012  54 651 1            TS     MODREG
  0067                          01,3013  54 676 1            TS     CADRSTOR
  0068                          01,3014  54 653 0            TS     REQRET
  0069                          01,3015  54 655 0            TS     CLPASS
  0070                          01,3016  54 652 1            TS     DSPLOCK
  0071                          01,3017  54 660 0            TS     MONSAVE            KILL MONITOR
  0072                          01,3020  54 661 1            TS     MONSAVE1
```

```
0073                    01,3021  54 677 0          TS      GRABLOCK
0074                    01,3022  54 641 0          TS      VERBREG
0075                    01,3023  54 642 0          TS      NOUNREG
0076                    01,3024  54 702 0          TS      DSPLIST
0077                    01,3025  54 703 1          TS      DSPLIST +1
0078                    01,3026  54 704 0          TS      DSPLIST +2
```

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0079              01,3027  54 620 1              TS      STATE           TURN OFF INTERPRETER SWITCHES.
0080              01,3030  54 621 0              TS      STATE +1
0081              01,3031  54 622 0              TS      STATE +2
0082              01,3032  54 623 1              TS      STATE    +3
0083              01,3033  54 705 1              TS      EXTVBACT        MAKE EXTENDED VERBS AVAILABLE
0084              01,3034  3 7647 0              CAF     NOUTCON
0085              01,3035  54 656 0              TS      NOUT

00851             01,3036  4 3046 1              CS      CHAN11C         TURN OFF UPLINK ACTIVITY, KEY
00852             01,3037  0 0006 1              EXTEND                  RLSE, V/N FLASH, OPERATOR ERROR
00853             01,3040  03 011 1              WAND    DSALMOUT        IN BOTH FRESH START AND RESTART.
00854             01,3041  3 3047 1              CAF     LESCHK          SELF CHECK GO-TO REGISTER.
00855             01,3042  55'043 0              TS      SELFRET
0086              01,3043  4 4506 1              CS      VD1
0087              01,3044  54 637 1              TS      DSPCOUNT
0088              01,3045  0 0114 0              TC      BUF

00881             01,3046   00164 1  CHAN11C     OCT     00164           CHAN 11 BITS 3,5,6,7.
A00882                                                                   UPLINK ACTIVITY, KEY RLSE,
A00883                                                                   V/N FLASH, OPERATOR ERROR.
00884             01,3047   05010 0  LESCHK      ADRES   SMODECHK
0089              01,3050   00264 1  VAC1ADRC    ADRES   VAC1USE
0090              01,3051   00054 0  LTHVACA     DEC     44
```

```
        T4RUPT PROGRAM                                                                  USER'S OWN PAGE NO.   1

 0001                         01,3052  54 016 1  T4RUPT   TS      BANKRUPT
 0002                         01,3053  56 002 0           XCH     Q
 0003                         01,3054  54 012 0           TS      QRUPT
 0004                         01,3055  3 7653 0           CAF     ZERO
 0005                         01,3056  0 0006 1           EXTEND
 0006                         01,3057  01 010 1           WRITE   OUTO
 0007                         01,3060  11'020 0           CCS     DSRUPTSW
 0008                         01,3061  0 3063 1           TC      SPECRUPT            ZERO OUTO 10 MS AFTER REGULAR T4RUPT.
 0009                         01,3062  0 3072 1           TC      T4RUPTA

 0010                         01,3063  3 7653 0  SPECRUPT CAF     ZERO
 0011                         01,3064  55'020 0           TS      DSRUPTSW
 0012                         01,3065  3 3071 1           CAF     110MRUPT            RE ESTABLISH 120 MS PERIOD
 0013                         01,3066  54 027 0           TS      TIME4
 0014                         01,3067  0 4325 1           TC      RESUME
 00141                        01,3070   37764 0  120MRUPT OCT     37764
 0015                         01,3071   37765 1  110MRUPT OCT     37765


R0016   RELTAB IS A PACKED TABLE. RELAYWORD CODE IN UPPER 4 BITS, RELAY CODE
R0017   IN LOWER 5 BITS.

 0018                                    4333             SETLOC  ENDWAITF            IN F/F

 0019                            4333   04025 1  RELTAB   OCT     04025
 0020                            4334   10003 0           OCT     10003
 0021                            4335   14031 0           OCT     14031
 0022                            4336   20033 0           OCT     20033
 0023                            4337   24017 1           OCT     24017
 0024                            4340   30036 1           OCT     30036
 0025                            4341   34034 1           OCT     34034
 0026                            4342   40023 1           OCT     40023
 0027                            4343   44035 1           OCT     44035
 0028                            4344   50037 0           OCT     50037
 0029                            4345   54000 0           OCT     54000
 0030                            4346   60000 1  RELTAB11 OCT     60000


 00301                                   4347  ENDT4FF  EQUALS


 0033                                 01,3072             SETLOC  110MRUPT +1         IN BANK

 00331                        01,3072  3 3070 0  T4RUPTA  CAF     120MRUPT
 00332                        01,3073  54 027 0           TS      TIME4
 0034                         01,3074  10 675 1  CDRVE    CCS     DSPTAB +11D
 0035                         01,3075  0 3104 1           TC      DSPOUT
```

```
0036                    01,3076   0 3104 1          TC      DSPOUT
0037                    01,3077  56 675  0          XCH     DSPTAB +11D
0038                    01,3100   7 4503 1          MASK    LOW11
0039                    01,3101  54 675  1          TS      DSPTAB +11D
0040                    01,3102   6 4346 1          AD      RELTAB11
0041                    01,3103   0 3143 1          TC      DSPLAYC
```

```
P0058   DSPOUT PROGRAM. PUTS OUT DISPLAYS.

0059          01,3104  10 656 0  DSPOUT   CCS     NOUT           ENTERED IN INTERRUPTED STATE AT END OF
0060          01,3105  0 3107 1           TC      +2                                              DSRUPT
0061          01,3106  0 4325 1           TC      LVDSRUPT
0062          01,3107  54 656 0           TS      NOUT
0063          01,3110  4 7653 1           CS      ZERO
0064          01,3111  54 624 0           TS      DSRUPTEM       SET TO -0 FOR 1ST PASS THRU DSPTAB
0065          01,3112  56 714 0           XCH     DSPCNT
0066          01,3113  6 7654 1           AD      NEGO           TO PREVENT +0
0067          01,3114  54 714 1           TS      DSPCNT
0068          01,3115  50 714 0  DSPSCAN  INDEX   DSPCNT
0069          01,3116  10 662 1           CCS     DSPTAB
0070          01,3117  10 714 1           CCS     DSPCNT         IF DSPTAB ENTRY +, SKIP
0071          01,3120  0 3113 1           TC      DSPSCAN -2     IF DSPCNT +, AGAIN
0072          01,3121  0 3132 1           TC      DSPLAY         IF DSPTAB ENTRY -, DISPLAY
0073          01,3122   00012 1  TABLNTH  OCT     12             DEC 10   LENGTH OF DSPTAB
0074          01,3123  10 624 0           CCS     DSRUPTEM       IF DSRUPTEM=+0,2ND PASS THRU DSPTAB
0075                    01,3125           LOC     +1             (DSPCNT=0), +0 INTO NOUT, RESUME
0076          01,3125  54 656 0           TS      NOUT
0077          01,3126  0 4325 1           TC      LVDSRUPT
0078          01,3127  54 624 0           TS      DSRUPTEM       IF DSRUPTEM=-0,1ST PASS THRU DSPTAB
0079          01,3130  3 3122 0           CAF     TABLNTH        (DSPCNT=0). +0 INTO DSRUPTEM, PASS AGAIN
0080          01,3131  0 3114 0           TC      DSPSCAN -1

0081          01,3132  6 7646 1  DSPLAY   AD      ONE
0082          01,3133  50 714 0           INDEX   DSPCNT
0083          01,3134  54 662 1           TS      DSPTAB         REPLACE POSITIVELY
0084          01,3135  7 4503 1           MASK    LOW11          REMOVE BITS 12 TO 15
0085          01,3136  54 624 0           TS      DSRUPTEM
0086          01,3137  3 4475 0           CAF     HI5
0087          01,3140  50 714 0           INDEX   DSPCNT
0088          01,3141  7 4333 1           MASK    RELTAB         PICK UP BITS 12 TO 15 OF RELTAB ENTRY
0089          01,3142  6 0624 1           AD      DSRUPTEM
0090          01,3143  0 0006 1  DSPLAYC  EXTEND
0091          01,3144  01 010 1           WRITE   OUT0
0092          01,3145  55'023 0           TS      DISPBUF        THIS WILL BE SENT DOWN NEXT TM CYCLE.

0093          01,3146  3 7626 1           CAF     10MSRUPT       SET T4 TO INTERRUPT IN 10 MS.
0094          01,3147  54 027 0           TS      TIME4
0095          01,3150  3 7646 1           CAF     ONE
0096          01,3151  55'020 0           TS      DSRUPTSW       SET FOR SPECRUPT

0097          01,3152  0 4325 1           TC      LVDSRUPT

0098                       4325  LVDSRUPT EQUALS  RESUME
0099                       7626  10MSRUPT =       POSMAX
```

```
        KEYRUPT, UPRUPT                                                                         USER'S OWN PAGE NO.   1

 0001                      01,3153  54 016 1  KEYRUPT1 TS      BANKRUPT
 0002                      01,3154  56 002 0           XCH     Q
 0003                      01,3155  54 012 0           TS      QRUPT
 0004                      01,3156  0 4526 1           TC      LODSAMPT            TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0005                      01,3157  3 4473 0           CAF     LOW5
 0006                      01,3160  0 0006 1           EXTEND
 0007                      01,3161  02 015 1           RAND    MNKEYIN
 0008                      01,3162  6 7634 1  KEYCOM   AD      BIT11
 0009                      01,3163  55 024 1           TS      TMKEYBUF
 0010                      01,3164  3 4502 1           CAF     CHRPRIO
 0011                      01,3165  0 4131 0           TC      NOVAC
 0012                                     E1           EBANK=  DSPCOUNT
 0013                      01,3166   02002 1           2CADR   CHARIN
C0013                      01,3167   10001 1
 0014                      01,3170  3 4473 0           CAF     LOW5
 0015                      01,3171  7 1024 1           MASK    TMKEYBUF
 0016                      01,3172  50 635 1           INDEX   LOCCTR
 0017                      01,3173  54 140 0           TS      MPAC                LEAVE 5 BIT KEY CDE IN MPAC FOR CHARIN
 0018                      01,3174  0 4325 1           TC      RESUME


 0019                      01,3175  54 016 1  KEYRUPT2 TS      BANKRUPT
 0020                      01,3176  56 002 0           XCH     Q
 0021                      01,3177  54 012 0           TS      QRUPT
 0022                      01,3200  0 4526 1           TC      LODSAMPT            TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0023                      01,3201  3 4473 0           CAF     LOW5
 0024                      01,3202  0 0006 1           EXTEND
 0025                      01,3203  02 016 1           RAND    NAVKEYIN
 0026                      01,3204  0 3162 1           TC      KEYCOM
```

```
         KEYRUPT, UPRUPT                                                             USER'S OWN PAGE NO.   2

P0027    UPRUPT PROGRAM

 0028                      01,3205  54 016 1  UPRUPT     TS       BANKRUPT
 0029                      01,3206  56 002 0             XCH      Q
 0030                      01,3207  54 012 0             TS       QRUPT
 0031                      01,3210  0 4526 1             TC       LODSAMPT           TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0032                      01,3211  3 7653 0             CAF      ZERO
 0033                      01,3212  56 045 0             XCH      INLINK
 0034                      01,3213  54 624 0             TS       KEYTEMP1
 0035                      01,3214  3 7644 0             CAF      BIT3               TURN ON UPACT LIGHT
 0036                      01,3215  0 0006 1             EXTEND                      (BIT 3 OF CHANNEL 11)
 0037                      01,3216  05 011 1             WOR      DSALMOUT
 0038                      01,3217  3 4473 0  UPRPT1     CAF      LOW5               TEST FOR TRIPLE CHAR REDUNDANCY
 0039                      01,3220  7 0624 0             MASK     KEYTEMP1           LOW5 OF WORD
 0040                      01,3221  56 624 1             XCH      KEYTEMP1           LOW5 INTO KEYTEMP1
 0041                      01,3222  56 021 1             XCH      SR                 WHOLE WORD INTO SR
 0042                      01,3223  54 636 0             TS       KEYTEMP2           ORIGINAL SR INTO KEYTEMP2
 0043                      01,3224  0 3274 0             TC       SRGHT5
 0044                      01,3225  7 4473 1             MASK     LOW5               MID 5
 0045                      01,3226  6 3311 1             AD       HI10
 0046                      01,3227  0 3303 1             TC       UPTEST
 0047                      01,3230  0 3274 0             TC       SRGHT5
 0048                      01,3231  7 4473 1             MASK     LOW5               HIGH 5
 0049                      01,3232  4 0000 0             COM
 0050                      01,3233  0 3303 1             TC       UPTEST
 0051                      01,3234  0 3270 1  UPOK       TC       RESTORSR           CODE IS GOOD
 0052                      01,3235  4 3241 1             CS       ELRCODE            IF CODE = ERROR LIGHT RESET, PUT +0
 0053                      01,3236  6 0624 1             AD       KEYTEMP1           INTO BIT1 OF UPLOCK.
 0054                      01,3237  10 000 0             CCS      A                  IF CODE NOT= ELR, PASS CODE ONLY IF
 0055                      01,3240  0 3247 0             TC       TSTUPLOK           BIT1 OF UPLOCK = 0.
 0056                      01,3241   00022 1  ELRCODE    OCT      22
 0057                      01,3242  0 3247 0             TC       TSTUPLOK
 0058                      01,3243  4 7646 0             CS       BIT1               PUT 0 INTO BIT1 OF UPLOCK
 0059                      01,3244  7 0715 0             MASK     UPLOCK
 0060                      01,3245  54 715 0             TS       UPLOCK
 0061                      01,3246  0 3253 0             TC       ACCEPTUP
 0062                      01,3247  3 7646 1  TSTUPLOK   CAF      BIT1
 0063                      01,3250  7 0715 0             MASK     UPLOCK
 0064                      01,3251  10 000 0             CCS      A
 0065                      01,3252  0 4325 1             TC       RESUME             BIT1 OF UPLOCK = 1.
 0066                      01,3253  56 624 1  ACCEPTUP   XCH      KEYTEMP1           BIT1 OF UPLOCK = 0.
 0067                      01,3254  6 7641 0             AD       BIT6
 0068                      01,3255  0 3162 1             TC       KEYCOM

 0069                      01,3256  0 3270 1  TMFAIL2    TC       RESTORSR           CODE IS BAD
 0070                      01,3257  4 7646 0             CS       BIT1               LOCK OUT FURTHER UPLINK ACTIVITY (BY
 0071                      01,3260  7 0715 0             MASK     UPLOCK             PUTTING 1 INTO BIT1 OF UPLOCK) UNTIL ELR
 0072                      01,3261  6 7646 1             AD       BIT1               IS SENT UP UPLINK.
 0073                      01,3262  54 715 0             TS       UPLOCK
 0074                      01,3263  3 7636 0             CAF      BIT9               SEND DOWN INDICATION THAT UPLINK HAS
```

```
        KEYRUPT, UPRUPT                                                                   USER'S OWN PAGE NO.   3

 0075                          01,3264  6 7634 1             AD        BIT11              RECEIVED BAD CODE.
 0076                          01,3265  55'024 1             TS        TMKEYBUF
 0077                          01,3266  0 4325 1  TMFAIL1    TC        TMALM
 0078                          01,3267  0 4325 1             TC        RESUME

 0079                          01,3270  56 636 1  RESTORSR   XCH       KEYTEMP2
 0080                          01,3271  6 0000 1             DOUBLE
 0081                          01,3272  54 021 0             TS        SR
 0082                          01,3273  0 0002 0             TC        Q

 0083                                       4325  TMALM      =         RESUME             FOR NOW

 0084                          01,3274  4 0021 0  SRGHT5     CS        SR
 0085                          01,3275  4 0021 0             CS        SR
 0086                          01,3276  4 0021 0             CS        SR
 0087                          01,3277  4 0021 0             CS        SR
 0088                          01,3300  4 0021 0             CS        SR
 0089                          01,3301  4 0000 0             CS        A
 0090                          01,3302  0 0002 0             TC        Q                  DELIVERS WORD UNCOMPLEMENTED

 0091                          01,3303  6 0624 1  UPTEST     AD        KEYTEMP1
 0092                          01,3304  10 000 0             CCS       A
 0093                          01,3305  0 3256 0             TC        TMFAIL2
 0094                                    01,3307             LOC       +1
 0095                          01,3307  0 3256 0             TC        TMFAIL2
 0096                          01,3310  0 0002 0             TC        Q

 0097                          01,3311    77740 1  HI10      OCT       77740
 0098                                       4214  UPBANK     EQUALS    EXECBANK           IN SAME BANK AS EXEC.

 0099                          01,3312    03777 0  B12-1     OCT       3777

R0100   UPACT IS TURNED OFF BY VBRELDSP, ALSO BY ERROR LIGHT RESET.
```

```
R0101    THE RECEPTION OF A BAD CODE BY UPLINK LOCKS OUT FURTHER UPLINK ACTIVITY
R0102    BY PLACING A 1 INTO BIT1 OF UPLOCK. BIT9 (ALONG WITH BIT11) OF TMKEYBUF
R0103    IS SET TO 1 TO SEND AN INDICATION OF THIS SITUATION DOWN THE DOWNLINK.
R0104    THE UPLINK INTERLOCK IS ALLOWED WHEN AN ERROR LIGHT RESET CODE IS SENT
R0105    UP THE UPLINK, OR WHEN A FRESH START IS PERFORMED.
```

```
R0001    KEYBOARD AND DISPLAY PROGRAM


R0002    THE FOLLOWING QUOTATION IS PROVIDED THROUGH THE COUTESY OF THE AUTHORS.

R0003          !!IT WILL BE PROVED TO THY FACE THAT THOU HAST MEN ABOUT THEE THAT
R0004    USUALLY TALK OF A NOUN AND A VERB, AND SUCH ABOMINABLE WORDS AS NO
R0005    CHRISTIAN EAR CAN ENDURE TO HEAR.!!

R0006                        HENRY 6, ACT 2, SCENE 4


R0007    THE FOLLOWING ASSIGNMENTS FOR PINBALL ARE MADE ELSEWHERE


R0008    RESERVED FOR PINBALL EXECUTIVE ACTION

R0009    DSPCOUNT ERASE                   DISPLAY POSITION INDICATOR
R0010    DECBRNCH ERASE                   +DEC, - DEC, OCT INDICATOR
R0011    VERBREG  ERASE                   VERB CODE
R0012    NOUNREG  ERASE                   NOUN CODE
R0013    XREG     ERASE                   R1 INPUT BUFFER
R0014    YREG     ERASE                   R2 INPUT BUFFER
R0015    ZREG     ERASE                   R3 INPUT BUFFER
R0016    XREGLP   ERASE                   LO PART OF XREG (FOR DEC CONV ONLY)
R0017    YREGLP   ERASE                   LO PART OF YREG (FOR DEC CONV ONLY)
R0018    ZREGLP   ERASE                   LO PART OF ZREG (FOR DEC CONV ONLY)
R0019    MODREG   ERASE                   MODE CODE
R0020    DSPLOCK  ERASE                   KEYBOARD/SUBROUTINE CALL INTERLOCK
R0021    REQRET   ERASE                   RETURN REGISTER FOR LOAD
R0022    LOADSTAT ERASE                   STATUS INDICATOR FOR LOADTST
R0023    CLPASS   ERASE                   PASS INDICATOR CLEAR
R0024    NOUT     ERASE                   ACTIVITY COUNTER FOR DSPTAB
R0025    NOUNCADR ERASE                   MACHINE CADR FOR NOUN
R0026    MONSAVE  ERASE                   N/V CODE FOR MONITOR. (= MONSAVE1-1)
R0027    MONSAVE1 ERASE                   NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
R0028    DSPTAB   ERASE         +13D      0-10,DISPLAY PANEL BUFFER.11-13,C RELAYS
R0029    CADRSTOR ERASE                   ENDIDLE STORAGE
R0030    GRABLOCK ERASE                   INTERNAL INTERLOCK FOR DISPLAY SYSTEM
R0031    NVQTEM   ERASE                   NVSUB STORAGE FOR CALLING ADDRESS
R0032                                     MUST = NVBNKTEM-1
R0033    NVBNKTEM ERASE                   NVSUB STORAGE FOR CALLING BANK
R0034                                     MUST = NVQTEM+1
R0035    DSPLIST  ERASE         +2        WAITING LIST FOR DSP SYST INTERNAL USE
R0036    EXTVBACT REASE                   EXTENDED VERB ACTIVITY INTERLOCK
R0037    DSPTEM1  ERASE         +2        BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
R0038    DSPTEM2  ERASE         +2        BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
```

```
R0039   END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION


R0040   TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R0041   DSEXIT   =      INTB15+               RETURN FOR DSPIN
R0042   EXITEM   =      INTB15+               RETURN FOR SCALE FACTOR ROUTINE SELECT
R0043   BLANKRET =      INTB15+               RETURN FOR 2BLANK

R0044   WRDRET   =      INTBIT15              RETURN FOR 5BLANK
R0045   WDRET    =      INTBIT15              RETURN FOR DSPWD
R0046   DECRET   =      INTBIT15              RETURN FOR PUTCOM(DEC LOAD)
R0047   21/22REG =      INTBIT15              TEMP FOR CHARIN

R0048   UPDATRET =      POLISH                RETURN FOR UPDATNN, UPDATVB
R0049   CHAR     =      POLISH                TEMP FOR CHARIN
R0050   ERCNT    =      POLISH                COUNTER FOR ERROR LIGHT RESET
R0051   DECOUNT  =      POLISH                COUNTER FOR SCALING AND DISPLAY (DEC)

R0052   SGNON    =      VBUF                  TEMP FOR +,- ON
R0053   NOUNTEM  =      VBUF                  COUNTER FOR MIXNOUN FETCH
R0054   DISTEM   =      VBUF                  COUNTER FOR OCTAL DISPLAY VERBS
R0055   DECTEM   =      VBUF                  COUNTER FOR FETCH (DEC DISPLAY VERBS)

R0056   SGNOFF   =      VBUF     +1           TEMP FOR +,- ON
R0057   NVTEMP   =      VBUF     +1           TEMP FOR NVSUB
R0058   SFTEMP1  =      VBUF     +1           STORAGE FOR SF CONST HI PART(=SFTEMP2-1)

R0059   CODE     =      VBUF     +2           FOR DSPIN
R0060   SFTEMP2  =      VBUF     +2           STORAGE FOR SF CONST LO PART(=SFTEMP1+1)

R0061   MIXTEMP  =      VBUF     +3           FOR MIXNOUN DATA
R0062   SIGNRET  =      VBUF     +3           RETURN FOR +,- ON

R0063   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

R0064   ENTRET   =      DOTINC                EXIT FROM ENTER

R0065   WDCNT    =      DOTRET                CHAR COUNTER FOR DSPWD
R0066   INREL    =      DOTRET                INPUT BUFFER SELECTOR ( X,Y,Z, REG )

R00671  DSPMMTEM =      MATINC                DSPCOUNT SAVE FOR DSPMM
R0068   MIXBR    =      MATINC                INDICATOR FOR MIXED OR NORMAL NOUN

R0069   TEM1     ERASE                        EXEC TEMP
R0070   DSREL    =      TEM1                  REL ADDRESS FOR DSPIN

R0071   TEM2     ERASE                        EXEC TEMP
R0072   DSMAG    =      TEM2                  MAGNITUDE STORE FOR DSPIN
```

```
R0073    IDADDTEM =       TEM2               MIXNOUN INDIRECT ADDRESS STORAGE

R0074    TEM3     ERASE                      EXEC TEMP
R0075    COUNT    =       TEM3               FOR DSPIN

R0076    TEM4     ERASE                      EXEC TEMP
R0077    LSTPTR   =       TEM4               LIST POINTER FOR GRABUSY
R0078    RELRET   =       TEM4               RETURN FOR RELDSP
R0079    FREERET  =       TEM4               RETURN FOR FREEDSP

R0080    TEM5     ERASE                      EXEC TEMP
R0081    NOUNADD  =       TEM5               TEMP STORAGE FOR NOUN ADDRESS

R0082    NNADTEM  ERASE                      TEMP FOR NOUN ADDRESS TABLE ENTRY
R0083    NNTYPTEM ERASE                      TEMP FOR NOUN TYPE TABLE ENTRY
R0084    IDAD1TEM ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0085                                        MUST = IDAD2TEM-1, = IDAD3TEM-2.
R0086    IDAD2TEM ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0087                                        MUST = IDAD1TEM+1, = IDAD3TEM-1.
R0088    IDAD3TEM ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0089                                        MUST = IDAD1TEM+2, = IDAD2TEM+1.
R0090    RUTMXTEM ERASE                      TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
R0091    END OF TEMPORARIES FOR PINBALL EXECUTIVE ACTION


R0092    RESERVED FOR PINBALL INTERRUPT ACTION

R0093    DSPCNT   ERASE                      COUNTER FOR DSPOUT
R0094    UPLOCK   ERASE                      BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0095                                                                   RECEPTION OF A BAD MESSAGE IN UPLINK)
R0096    END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION


R0097    TEMPORARIES FOR PINBALL INTERRUPT ACTION

R0098    KEYTEMP1 =       WAITEXIT           TEMP FOR KEYRUPT, UPRUPT
R0099    DSRUPTEM =       WAITEXIT           TEMP FOR DSPOUT
R0100    KEYTEMP2 =       RUPTAGN            TEMP FOR KEYRUPT, UPRUPT
R0101    END OF TEMPORARIES FOR PINBALL INTERRUPT ACTION
```

```
R0102   THE INPUT CODES ASSUMED FOR THE KEYBOARD ARE,
R0103   0          10000
R0104   1          00001
R0105   9          01001
R0106   VERB       10001
R0107   ERROR RES10010
R0108   KEY RLSE 11001
R0109   +          11010
R0110   -          11011
R0111   ENTER      11100
R0112   CLEAR      11110
R0113   NOUN       11111



R0114   OUTPUT FORMAT FOR DISPLAY PANEL. SET OUT0 TO  AAAABCCCCCDDDDD.
R0115   A-S SELECT A RELAYWORD. THIS DETERMINES WHICH PAIR OF CHARACTERS ARE
R0116   ENERGIZED.
R0117   B FOR SPECIAL RELAYS SUCH AS SIGNS ETC.
R0118   C-S  5 BIT RELAY CODE FOR LEFT CHAR OF PAIR SELECTED BY RELAYWORD
R0119   D-S  5 BIT RELAY CODE FOR RIGHTCHAR OF PAIR SELECTED BY RELAYWORD.

R0120   THE PANEL APPEARS AS FOLLOWS,
R0121   MD1     MD2                               (MAJOR MODE)
R0122   VD1     VD2 (VERB)     ND1      ND2       (NOUN)
R0123   R1D1    R1D2    R1D3   R1D4     R1D5      (R1)
R0124   R2D1    R2D2    R2D3   R2D4     R2D5      (R2)
R0125   R3D1    R3D2    R3D3   R3D4     R3D5      (R3)

R0126   EACH OF THESE IS GIVEN A DSPCOUNT NUMBER FOR USE WITHIN COMPUTATION ONLY
R0127   MD1    25      R2D1  11          ALL ARE OCTAL
R0128   MD2    24      R2D2  10
R0129   VD1    23      R2D3   7
R0130   VD2    22      R2D4   6
R0131   ND1    21      R2D5   5
R0132   ND2    20      R3D1   4
R0133   R1D1   16      R3D2   3
R0134   R1D2   15      R3D3   2
R0135   R1D3   14      R3D4   1
R0136   R1D4   13      R3D5   0
R0137   R1D5   12



R0138   THERE IS AN 11 REGISTER TABLE (DSPTAB) FOR THE DISPLAY PANEL.

R0139   DSPTAB RELAYWD        BIT11      BITS 10-6      BITS 5-1
R0140   RELADD
R0141   10      1011                     MD1  (25)      MD2  (24)
R0142   9       1010                     VD1  (23)      VD2  (22)
```

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        PINBALL GAME  BUTTONS AND LIGHTS                                                    USER'S OWN PAGE NO.   5

R0143   8       1001                      ND1  (21)     ND2  (20)
R0144   7       1000                                    R1D1 (16)
R0145   6       0111          +R1         R1D2 (15)     R1D3 (14)
R0146   5       0110          -R1         R1D4 (13)     R1D5 (12)
R0147   4       0101          +R2         R2D1 (11)     R2D2 (10)
R0148   3       0100          -R2         R2D3 (7)      R2D4 (6)
R0149   2       0011                      R2D5 (5)      R3D1 (4)
R0150   1       0010          +R3         R3D2 (3)      R3D3 (2)
R0151   0       0001          -R3         R3D4 (1)      R3D5 (0)
R0152           0000   NO RELAYWORD


R0153   THE 5 BIT RELAY CODES ARE,
R0154   BLANK       00000
R0155   0           10101
R0156   1           00011
R0157   2           11001
R0158   3           11011
R0159   4           01111
R0160   5           11110
R0161   6           11100
R0162   7           10011
R0163   8           11101
R0164   9           11111
```

```
P0165    START OF EXECUTIVE SECTION OF PINBALL


0166                          04,2000              SETLOC 20000

0167                   04,2000  0 3432 1  GRABUSYB TC     GRABUSY1        STANDARD LEAD INS. DONT MOVE.
0168                   04,2001  0 3454 1  NVSUBSYB TC     NVSUBSY1

0169                   04,2002  3 7646 1  CHARIN   CAF    ONE             BLOCK DISPLAY SYST
0170                   04,2003  56 652 0           XCH    DSPLOCK         MAKE DSP SYST BUSY, BUT SAVE OLD
0171                   04,2004  54 101 0           TS     21/22REG        C(DSPLOCK) FOR ERROR LIGHT RESET.
0172                   04,2005  56 140 1           XCH    MPAC
0173                   04,2006  54 103 1           TS     CHAR
0174                   04,2007  50 000 1           INDEX  A
0175                   04,2010  0 2011 0           TC     +1              INPUT CODE     FUNCTION
0176                   04,2011  0 3253 0           TC     CHARALRM        0
0177                   04,2012  0 2062 1           TC     NUM             1
0178                   04,2013  0 2062 1           TC     NUM             2
0179                   04,2014  0 2062 1           TC     NUM             3
0180                   04,2015  0 2062 1           TC     NUM             4
0181                   04,2016  0 2062 1           TC     NUM             5
0182                   04,2017  0 2062 1           TC     NUM             6
0183                   04,2020  0 2062 1           TC     NUM             7
0184                   04,2021  0 2053 0           TC     89TEST          10             8
0185                   04,2022  0 2053 0           TC     89TEST          11             9
0186                   04,2023  0 3253 0           TC     CHARALRM        12
0187                   04,2024  0 3253 0           TC     CHARALRM        13
0188                   04,2025  0 3253 0           TC     CHARALRM        14
0189                   04,2026  0 3253 0           TC     CHARALRM        15
0190                   04,2027  0 3253 0           TC     CHARALRM        16
0191                   04,2030  0 3253 0           TC     CHARALRM        17
0192                   04,2031  0 2060 0           TC     NUM     -2      20             0
0193                   04,2032  0 2235 1           TC     VERB            21             VERB
0194                   04,2033  0 2343 1           TC     ERROR           22             ERROR LIGHT RESET
0195                   04,2034  0 3253 0           TC     CHARALRM        23
0196                   04,2035  0 3253 0           TC     CHARALRM        24
0197                   04,2036  0 3253 0           TC     CHARALRM        25
0198                   04,2037  0 3253 0           TC     CHARALRM        26
0199                   04,2040  0 3253 0           TC     CHARALRM        27
0200                   04,2041  0 3253 0           TC     CHARALRM        30
0201                   04,2042  0 3276 1           TC     VBRELDSP        31             KEY RELEASE
0202                   04,2043  0 2267 0           TC     POSGN           32             +
0203                   04,2044  0 2254 0           TC     NEGSGN          33             -
0204                   04,2045  0 2051 1           TC     ENTERJMP        34             ENTER
0205                   04,2046  0 3253 0           TC     CHARALRM        35
0206                   04,2047  0 2407 0           TC     CLEAR           36             CLEAR
0207                   04,2050  0 2250 1           TC     NOUN            37             NOUN
```

```
0208                       04,2051  0 4102 0  ENTERJMP TC      POSTJUMP
0209                       04,2052   12003 1           CADR    ENTER

0211                       04,2053  3 6165 0  89TEST   CAF     THREE
0212                       04,2054  7 0640 1           MASK    DECBRNCH
0213                       04,2055  10 000 0           CCS     A
0214                       04,2056  0 2062 1           TC      NUM             IF DECBRNCH IS +, 8 OR 9 OK
0215                       04,2057  0 3253 0           TC      CHARALRM        IF DECBRNCH IS +0, REJECT 8 OR 9


R0216     NUM ASSEMBLES OCTAL 3 BITS AT A TIME. FOR DECIMAL IT CONVERTS INCOMING
R0217     WORD AS A FRACTION, KEEPING RESULTS TO DP.
R0218     OCTAL RESULTS ARE LEFT IN XREG, YREG, OR ZREG. HI PART OF DEC IN XREG,
R0219     YREG, ZREG. THE LOW PARTS IN XREGLP, YREGLP, OR ZREGLP)
R0220     DECBRNCH IS LEFT AT +0 FOR OCT, +1 FOR + DEC, +2 FOR - DEC.
R0221     IF DSPCOUNT WAS LEFT -, NO MORE DATA IS ACCEPTED.

0222                       04,2060  3 7653 0           CAF     ZERO
0223                       04,2061  54 103 1           TS      CHAR
0224                       04,2062  10 637 1  NUM      CCS     DSPCOUNT
0225                       04,2063  0 2067 1           TC      +4              +
0226                       04,2064  0 2067 1           TC      +3              +0
0227                       04,2065  0 2066 0           TC      +1              -BLOCK DATA IN IF DSPCOUNT IS -
0228                       04,2066  0 4205 1           TC      ENDOFJOB        -0
0229                       04,2067  0 2205 1           TC      GETINREL
0230                       04,2070  10 655 0           CCS     CLPASS          IF CLPASS IS + OR +0, MAKE IT +0.
0231                       04,2071  3 7653 0           CAF     ZERO
0232                       04,2072  54 655 0           TS      CLPASS
0233                       04,2073  0 2074 0           TC      +1
0234                       04,2074  50 103 0           INDEX   CHAR
0235                       04,2075  3 4333 0           CAF     RELTAB
0236                       04,2076  7 4473 1           MASK    LOW5
0237                       04,2077  54 110 0           TS      CODE
0238                       04,2100  3 0637 0           CA      DSPCOUNT
0239                       04,2101  54 127 1           TS      COUNT
0240                       04,2102  0 3157 1           TC      DSPIN
0241                       04,2103  3 6165 0           CAF     THREE
0242                       04,2104  7 0640 1           MASK    DECBRNCH
0243                       04,2105  10 000 0           CCS     A               +0, OCTAL.  +1, + DEC.  +2, - DEC.
0244                       04,2106  0 2117 1           TC      DECTOBIN        +
0245                       04,2107  50 123 1           INDEX   INREL           +0 OCTAL
0246                       04,2110  56 641 1           XCH     VERBREG
0247                       04,2111  54 022 0           TS      CYL
0248                       04,2112  4 0022 0           CS      CYL
0249                       04,2113  4 0022 0           CS      CYL
0250                       04,2114  56 022 1           XCH     CYL
0251                       04,2115  6 0103 0           AD      CHAR
0252                       04,2116  0 2134 0           TC      ENDNMTST
0253                       04,2117  50 123 1  DECTOBIN INDEX   INREL
```

PINBALL GAME BUTTONS AND LIGHTS USER'S OWN PAGE NO. 8

```
04,2120  56 641 1             XCH     VERBREG
04,2121  54 140 0             TS      MPAC            SUM X 2EXP-14 IN MPAC
04,2122  3 7653 0             CAF     ZERO
04,2123  54 141 1             TS      MPAC     +1
04,2124  3 7650 0             CAF     TEN             10 X 2EXP-14
04,2125  0 7257 0             TC      SHORTMP         10SUM X 2EXP-28 IN MPAC, MPAC+1
04,2126  56 141 0             XCH     MPAC     +1
04,2127  6 0103 0             AD      CHAR
04,2130  54 141 1             TS      MPAC     +1
04,2131  0 2134 0             TC      ENDNMTST        NO DF
04,2132  26 140 0             ADS     MPAC            DF MUST BE 5TH CHAR
04,2133  0 2152 0             TC      DECEND
04,2134  50 123 1  ENDNMTST   INDEX   INREL
04,2135  54 641 0             TS      VERBREG
04,2136  4 0637 1             CS      DSPCOUNT
04,2137  50 123 1             INDEX   INREL
04,2140  6 2176 0             AD      CRITCON
04,2141  0 0006 1             EXTEND
04,2142  1 2144 0             BZF     ENDNUM          -0, DSPCOUNT = CRITCON
04,2143  0 2173 0             TC      MORNUM          - , DSPCOUNT G/ CRITCON
04,2144  3 6165 0  ENDNUM     CAF     THREE
04,2145  7 0640 1             MASK    DECBRNCH
04,2146  10 000 0             CCS     A
04,2147  0 2152 0             TC      DECEND
04,2150  4 0637 1  ENDALL     CS      DSPCOUNT        BLOCK NUMIN BY PLACING DSPCOUNT
04,2151  0 2174 1             TC      MORNUM   +1     NEGATIVELY
04,2152  0 7062 1  DECEND     TC      DMP             MULT SUM X 2EXP-28 IN MPAC, MPAC+1 BY
04,2153   02203 1             ADRES   DECON           2EXP14/10EXP5. GIVES(SUM/10EXP5)X2EXP-14
04,2154  3 6165 0             CAF     THREE           IN MPAC, +1, +2,
04,2155  7 0640 1             MASK    DECBRNCH
04,2156  50 000 1             INDEX   A
04,2157  0 2157 0             TC      +0
04,2160  0 2164 0             TC      +DECSGN
04,2161  0 0006 1             EXTEND                  - CASE
04,2162  4 0142 1             DCS     MPAC     +1
04,2163  52 142 1             DXCH    MPAC     +1
04,2164  56 142 0  +DECSGN    XCH     MPAC     +2
04,2165  50 123 1             INDEX   INREL
04,2166  54 644 0             TS      XREGLP   -2
04,2167  56 141 0             XCH     MPAC     +1
04,2170  50 123 1             INDEX   INREL
04,2171  54 641 0             TS      VERBREG
04,2172  0 2150 1             TC      ENDALL
04,2173  10 637 1  MORNUM     CCS     DSPCOUNT        DECREMENT DSPCOUNT
04,2174  54 637 1             TS      DSPCOUNT
04,2175  0 4205 1             TC      ENDDFJOB

04,2176   00022 1  CRITCON    OCT     22              (DEC 18)
04,2177   00020 0             OCT     20              (DEC 16)
04,2200   00012 1             OCT     12              (DEC 10)
```

```
 0303                    04,2201   00005 1               OCT      5
 0304                    04,2202   00000 1               OCT      0

 0305                    04,2203   05174 0   DECON       2DEC     E-5 B14            2EXP14/10EXP5 = .16384 DEC
C0305                    04,2204   13261 0


R0306    GETINREL GETS PROPER DATA REG REL ADDRESS FOR CURRENT C(DSPCOUNT) AND
R0307    PUTS IN INTO INREL. +0 VERBREG, 1 NOUNREG, 2 XREG, 3 YREG, 4 ZREG.

 0308                    04,2205   50 637 0  GETINREL    INDEX    DSPCOUNT
 0309                    04,2206   3 2211 1              CAF      INRELTAB
 0310                    04,2207   54 123 0              TS       INREL              (A TEMP. REG)
 0311                    04,2210   0 0002 0              TC       Q

 0312                    04,2211   00004 0   INRELTAB    OCT      4                  R3D5 (DSPCOUNT = 0)
 0313                    04,2212   00004 0               OCT      4                  R3D4            =(1)
 0314                    04,2213   00004 0               OCT      4                  R3D3            =(2)
 0315                    04,2214   00004 0               OCT      4                  R3D2            =(3)
 0316                    04,2215   00004 0               OCT      4                  R3D1            =(4)
 0317                    04,2216   00003 1               OCT      3                  R2D5            =(5)
 0318                    04,2217   00003 1               OCT      3                  R2D4            =(6)
 0319                    04,2220   00003 1               OCT      3                  R2D3            =(7)
 0320                    04,2221   00003 1               OCT      3                  R2D2            =(8D)
 0321                    04,2222   00003 1               OCT      3                  R2D1            =(9D)
 0322                    04,2223   00002 0               OCT      2                  R1D5            =(10D)
 0323                    04,2224   00002 0               OCT      2                  R1D4            =(11D)
 0324                    04,2225   00002 0               OCT      2                  R1D3            =(12D)
 0325                    04,2226   00002 0               OCT      2                  R1D2            =(13D)
 0326                    04,2227   00002 0               OCT      2                  R1D1            =(14D)
 0327                              04,2231               LOC      +1                 NO DSPCOUNT NUMBER = 15D
 0328                    04,2231   00001 0               OCT      1                  ND2             =(16D)
 0329                    04,2232   00001 0               OCT      1                  ND1             =(17D)
 0330                    04,2233   00000 1               OCT      0                  VD2             =(18D)
 0331                    04,2234   00000 1               OCT      0                  VD1             =(19D)


 0332                    04,2235   3 7653 0  VERB        CAF      ZERO
 0333                    04,2236   54 641 0              TS       VERBREG
 0334                    04,2237   3 4506 0              CAF      VD1
 0335                    04,2240   54 637 1  NVCOM       TS       DSPCOUNT
 0336                    04,2241   0 2517 0              TC       2BLANK
 0337                    04,2242   3 7653 0              CAF      ZERO
 0338                    04,2243   54 640 1              TS       DECBRNCH
 0339                    04,2244   54 653 0              TS       REQRET             SET FOR ENTPASO
 0340                    04,2245   3 4417 1              CAF      ENDINST            IF DSPALARM OCCURS BEFORE FIRST ENTPASO
 0341                    04,2246   54 122 1              TS       ENTRET             OR NVSUB, ENTRET MUST ALREADY BE SET
A0342                                                                                TO TC ENDOFJOB
 0343                    04,2247   0 4205 1              TC       ENDOFJOB
```

```
0344   04,2250   3 7653 0  NOUN      CAF     ZERO
0345   04,2251  54 642 0             TS      NOUNREG
0346   04,2252   3 4507 1            CAF     ND1                 ND1, OCT 21 (DEC 17)
0347   04,2253   0 2240 0            TC      NVCOM


0348   04,2254   0 2326 1  NEGSGN    TC      SIGNTEST
0349   04,2255   0 2313 1            TC      -ON
0350   04,2256   3 7645 1            CAF     TWO
0351   04,2257  50 123 1   BOTHSGN   INDEX   INREL               SET DEC COMP BIT TO 1 (IN DECBRNCH)
0352   04,2260   6 7640 1            AD      BIT7                BIT 5 FOR R1,  BIT 4 FOR R2,
0353   04,2261  26 640 1             ADS     DECBRNCH            BIT 3 FOR R3.
0354   04,2262  10 655 0   FIXCLPAS  CCS     CLPASS              IF CLPASS IS + OR +0, MAKE IT +0.
0355   04,2263   3 7653 0            CAF     ZERO
0356   04,2264  54 655 0             TS      CLPASS
0357   04,2265   0 2266 1            TC      +1
0358   04,2266   0 4205 1            TC      ENDOFJOB

0359   04,2267   0 2326 1  POSGN     TC      SIGNTEST
0360   04,2270   0 2273 0            TC      +ON
0361   04,2271   3 7646 1            CAF     ONE
0362   04,2272   0 2257 0            TC      BOTHSGN

0363   04,2273  22 002 0   +ON       LXCH    Q
0364   04,2274   0 2205 1            TC      GETINREL
0365   04,2275  50 123 1             INDEX   INREL
0366   04,2276   3 2321 0            CAF     SGNTAB  -2
0367   04,2277  54 107 0             TS      SGNOFF
0368   04,2300   6 7646 1            AD      ONE
0369   04,2301  54 106 1             TS      SGNON
0370   04,2302   3 7653 0  SGNCOM    CAF     ZERO
0371   04,2303  54 110 0             TS      CODE
0372   04,2304  56 107 1             XCH     SGNOFF
0373   04,2305   0 3241 0            TC      11DSPIN
0374   04,2306   3 7634 1            CAF     BIT11
0375   04,2307  54 110 0             TS      CODE
0376   04,2310  56 106 0             XCH     SGNON
0377   04,2311   0 3241 0            TC      11DSPIN
0378   04,2312   0 0001 0            TC      L
0379   04,2313  22 002 0   -ON       LXCH    Q
0380   04,2314   0 2205 1            TC      GETINREL
0381   04,2315  50 123 1             INDEX   INREL
0382   04,2316   3 2321 0            CAF     SGNTAB  -2
0383   04,2317  54 106 1             TS      SGNON
0384   04,2320   6 7646 1            AD      ONE
0385   04,2321  54 107 0             TS      SGNOFF
0386   04,2322   0 2302 1            TC      SGNCOM

0387   04,2323     00005 1 SGNTAB    OCT     5                   -R1
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        PINBALL GAME  BUTTONS AND LIGHTS                                                USER.S OWN PAGE NO.  11

 0388                          04,2324   00003 1             OCT     3                    -R2
 0389                          04,2325   00000 1             OCT     0                    -R3



 0390                          04,2326  22 002 0  SIGNTEST LXCH    Q                    ALLOWS +,- ONLY WHEN DSPCOUNT=R1D1,
 0391                          04,2327  4 4444 0           CS      R1D1                 R2D1, OR R3D1.
 0392                          04,2330  0 2336 0           TC      SGNTST1
 0393                          04,2331  4 4445 1           CS      R2D1
 0394                          04,2332  0 2336 0           TC      SGNTST1
 0395                          04,2333  4 4446 1           CS      R3D1
 0396                          04,2334  0 2336 0           TC      SGNTST1
 0397                          04,2335  0 4205 1           TC      ENDOFJOB             NO MATCH FOUND. SIGN ILLEGAL
 0398                          04,2336  6 0637 0  SGNTST1  AD      DSPCOUNT
 0399                          04,2337  0 0006 1           EXTEND
 0400                          04,2340  1 2342 1           BZF     +2                   MATCH FOUND
 0401                          04,2341  0 0002 0           TC      Q
 0402                          04,2342  0 0001 0           TC      L                    SIGN LEGAL


R0403   ERROR LIGHT RESET (RSET) TURNS OFF,
R0404   UPLINK ACTIVITY, AUTO, HOLD, FREE, NO ATT, OPERATOR ERROR, TEMP, GIMBAL
R0405   LOCK, PROG ALM, TRACKER.
R04051  IT ALSO ZEROES THE :TEST ALARM: OUT BIT, WHICH TURNS OFF STBY,RESTART,
R04052  IT ALSO FORCES BIT 12 OF ALL DSPTAB ENTRIES TO 1.

 0406                          04,2343  56 101 1  ERROR    XCH     21/22REG             RESTORE ORIGINAL C(DSPLOCK). THUS ERROR
 0407                          04,2344  54 652 1           TS      DSPLOCK              LIGHT RESET LEAVES DSPLOCK UNCHANGED.
 0408                          04,2345  3 7630 0           CAF     BIT15                TURNS OFF  AUTO, HOLD, FREE, NO ATT,
 0409                          04,2346  54 675 1           TS      DSPTAB  +11D         GIMBAL LOCK, TRACKER, PROG ALM.
 0410                          04,2347  4 7635 1           CS      BIT10                TURN OFF :TEST ALARM: OUTBIT.
 0411                          04,2350  0 0006 1           EXTEND
 0412                          04,2351  03 013 0           WAND    CHAN13
 0413                          04,2352  4 2405 0           CS      ERCON                TURNS OFF  UPLINK ACTIVITY, TEMP,
 0414                          04,2353  0 0006 1           EXTEND                       OPERATOR ERROR.
 0415                          04,2354  03 011 1           WAND    DSALMOUT
 0416                          04,2355  3 4511 0  TSTAB    CAF     BINCON               (DEC 10)
 0417                          04,2356  54 103 1           TS      ERCNT                ERCNT = COUNT
 0418                          04,2357  0 0004 0           INHINT
 0419                          04,2360  50 103 0           INDEX   ERCNT
 0420                          04,2361  10 662 1           CCS     DSPTAB
 0421                          04,2362  6 7646 1           AD      ONE
 0422                          04,2363  0 2370 1           TC      ERPLUS
 0423                          04,2364  6 7646 1           AD      ONE
 0424                          04,2365  4 0000 0  ERMINUS  CS      A
 0425                          04,2366  7 2406 0           MASK    NOTBIT12
 0426                          04,2367  0 2373 1           TC      ERCOM
 0427                          04,2370  4 0000 0  ERPLUS   CS      A
 0428                          04,2371  7 2406 0           MASK    NOTBIT12
 0429             04,2372   4 0000 0              CS       A                 MIGHT WANT TO RESET CLPASS, DECBRNCH,
 0430             04,2373  50 103  0  ERCOM       INDEX    ERCNT             ETC.
 0431             04,2374  54 662  1              TS       DSPTAB
 0432             04,2375   0 0003 1              RELINT
 0433             04,2376  10 103  1              CCS      ERCNT
 0434             04,2377   0 2356 0              TC       TSTAB    +1
 0435             04,2400   3 7653 0              CAF      ZERO
 0436             04,2401  54 721  1              TS       FAILREG
 0437             04,2402  55,021  1              TS       OLDERR
 0438             04,2403  55,044  1              TS       SFAIL
 0442             04,2404   0 4205 1              TC       ENDOFJOB

 0443             04,2405    00114 0  ERCON       OCT      00114             CHAN 11  BIT 3,4,7.
A04431                                                                        UPLINK ACTIVITY, TEMP, OPERATOR
A04432                                                                        ERROR.
 0446             04,2406    73777 1  NOTBIT12    OCT      73777


R0448  CLEAR BLANKS WHICH R1, R2, R3 IS CURRENT OR LAST TO BE DISPLAYED(PERTINE
R0449  NT XREG,YREG,ZREG IS CLEARED). SUCCESSIVE CLEARS TAKE CARE OF EACH RX
R0450  L/ RC UNTIL R1 IS DONE. THEN NO FURTHER ACTION

R0451  THE SINGLE COMPONENT LOAD VERBS ALLOW ONLY THE SINGLE RC THAT IS
R0452  APPROPRIATE TO BE CLEARED.

R0453  CLPASS   +0  PASS0, CAN BE BACKED UP
R0454           +NZ  HIPASS, CAN BE BACKED UP
R0455           -NZ  PASS0, CANNOT BE BACKED UP

 0456             04,2407  10 637  1  CLEAR       CCS      DSPCOUNT
 0457             04,2410   6 7646 1              AD       ONE
 0458             04,2411   0 2413 0              TC       +2
 0459             04,2412   6 7646 1              AD       ONE
 0460             04,2413  54 637  1              TS       DSPCOUNT          MAG OF DSPCOUNT
 0461             04,2414   0 2205 1              TC       GETINREL          MUST SET INREL, EVEN FOR HIPASS
 0462             04,2415  10 655  0              CCS      CLPASS
 0463             04,2416   0 2424 1              TC       CLPASHI           +
 0464             04,2417   0 2421 1              TC       +2                +0    IF CLPASS IS +0 OR -, IT IS PASS0
 0465             04,2420   0 2421 1              TC       +1                -
 0466             04,2421   3 0123 1              CA       INREL
 0467             04,2422   0 2446 0              TC       LEGALTST
 0468             04,2423   0 2441 1              TC       CLEAR1
 0469             04,2424  10 123  0  CLPASHI     CCS      INREL
 0470             04,2425  54 123  0              TS       INREL
 0471             04,2426   0 2446 0              TC       LEGALTST
 0472             04,2427   3 2515 1              CAF      DOUBLK +2         +3 TO - NUMBER. BACKS DATA REQUESTS.
 0473             04,2430  26 653  0              ADS      REQRET
 0474             04,2431   3 0123 1              CA       INREL
 0475             04,2432  54 111  1              TS       MIXTEMP           TEMP STORAGE FOR INREL
```

```
04,2433   0 0006 1             EXTEND
04,2434  26 641 0              DIM      VERBREG          DECREMENT VERB AND RE-DISPLAY
04,2435   0 4063 0             TC       BANKCALL
04,2436    12315 0             CADR     UPDATVB
04,2437   3 0111 0             CA       MIXTEMP
04,2440  54 123 0              TS       INREL            RESTORE INREL
04,2441   0 2444 1  CLEAR1     TC       CLR5
04,2442  24 655 1              INCR     CLPASS           ONLY IF CLPASS IS + OR +0,
04,2443   0 4205 1             TC       ENDOFJOB         SET FOR HIGHER PASS.
04,2444  22 002 0   CLR5       LXCH     Q                USES 5BLANK  BUT AVOIDS ITS TC GETINREL
04,2445   0 2456 1             TC       5BLANK   +2
04,2446   6 7656 0  LEGALTST   AD       NEG2
04,2447  10 000 0              CCS      A
04,2450   0 0002 0             TC       Q                LEGAL  INREL G/ 2
           04,2452             LOC      +1
04,2452   0 4205 1             TC       ENDOFJOB         ILLEGAL   INREL= 0,1
04,2453   0 0002 0             TC       Q                LEGAL     INREL = 2


5BLANK BLANKS 5 CHAR DISPLAY WORD IN R1, R2, OR R3. IT ALSO ZEROES XREG.
YREG, OR ZREG.PLACE ANY + DSPCOUNT NUMBER FOR PERTINENT RC INTO DSPCOUNT
DSPCOUNT IS LEFT SET TO LEFT MOST DSP NUMB FOR RC JUST BLANKED.

04,2454  22 002 0   5BLANK     LXCH     Q
04,2455   0 2205 1             TC       GETINREL
04,2456   3 7653 0             CAF      ZERO
04,2457  50 123 1              INDEX    INREL
04,2460  54 641 0              TS       VERBREG          ZERO X, Y, Z REG.
04,2461  50 123 1              INDEX    INREL
04,2462  54 644 0              TS       XREGLP   -2
04,2463  54 110 0              TS       CODE
04,2464  50 123 1              INDEX    INREL            ZERO PERTINENT DEC COMP BIT.
04,2465   4 7640 0             CS       BIT7             PROTECT OTHERS
04,2466   7 0640 1             MASK     DECBRNCH
04,2467   7 2516 0             MASK     BRNCHCON         ZERO LOW 2 BITS.
04,2470  54 640 1              TS       DECBRNCH
04,2471  50 123 1              INDEX    INREL
04,2472   3 2506 0             CAF      SINBLANK -2      BLANK ISOLATED CHAR SEPARATELY
04,2473  54 127 1              TS       COUNT
04,2474   0 3157 1             TC       DSPIN
04,2475  50 123 1   5BLANK1    INDEX    INREL
04,2476   3 2511 0             CAF      DOUBLK   -2
04,2477  54 637 1              TS       DSPCOUNT
04,2500   0 2517 0             TC       2BLANK
04,2501   4 7645 0             CS       TWO
04,2502  26 637 1              ADS      DSPCOUNT
04,2503   0 2517 0             TC       2BLANK
04,2504  50 123 1              INDEX    INREL
04,2505   3 4442 1             CAF      R1D1     -2
```

```
 0523                    04,2506  54 637 1           TS       DSPCOUNT         SET DSPCOUNT TO LEFT MOST DSP NUMBER
 0524                    04,2507  0 0001 0           TC       L                OF REG. JUST BLANKED

 0525                    04,2510   00016 0  SINBLANK OCT      16               DEC 14
 0526                    04,2511   00005 1           OCT      5
 0527                    04,2512   00004 0           OCT      4
 0528                    04,2513   00015 0  DOUBLK   OCT      15               DEC 13
 0529                    04,2514   00011 1           OCT      11               DEC 9
 0530                    04,2515   00003 1           OCT      3

 0531                    04,2516   77774 0  BRNCHCON OCT      77774

R0532  2BLANK BLANKS TWO CHAR. PLACE DSP NUMBER OF LEFT CHAR  OF THE PAIR INTO
R0533  DSPCOUNT. THIS NUMBER IS LEFT IN DSPCOUNT

 0534                    04,2517  3 0637 0  2BLANK   CA       DSPCOUNT
 0535                    04,2520  54 021 0           TS       SR
 0536                    04,2521  4 2532 0           CS       BLANKCON
 0537                    04,2522  0 0004 0           INHINT
 0538                    04,2523  50 021 1           INDEX    SR
 0539                    04,2524  56 662 0           XCH      DSPTAB
 0540                    04,2525  0 0006 1           EXTEND
 0541                    04,2526  6 2530 0           BZMF     +2               IF OLD CONTENTS -, NOUT OK
 0542                    04,2527  24 656 1           INCR     NOUT             IF OLD CONTENTS +, +1 TO NOUT
 0543                    04,2530  0 0003 1           RELINT                    IF -,NOUT OK
 0544                    04,2531  0 0002 0           TC       Q
 0545                    04,2532   04000 0  BLANKCON OCT      4000
```

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        PINBALL GAME  BUTTONS AND LIGHTS                                                      USER'S OWN PAGE NO.  15

P0546   ENTER PASS 0 IS THE EXECUTE FUNCTION. HIGHER ORDER ENTERS ARE TO LOAD
R0547   DATA. THE SIGN OF REQRET DETERMINES THE PASS, + FOR PASS 0,- FOR HIGHER
R0548   PASSES.


R0549   MACHINE CADR TO BE SPECIFIED (MCTBS) NOUNS DESIRE AN ECADR TO BE LOADED
R0550   WHEN USED WITH LOAD VERBS, MONITOR VERBS, OR DISPLAY VERBS (EXCEPT
R0551   VERB = FIXED MEMORY DISPLAY, WHICH REQUIRES AN FCADR).


 0552                             05,2000              SETLOC  22000

 0553                   05,2000  0 3344 1  NVSUBB    TC      NVSUB1              STANDARD LEAD INS. DONT MOVE.
 0554                   05,2001  1 3403 1  DSPMM     TCF     DSPMM1
 0555                   05,2002  0 2663 0  LOADLV1   TC      LOADLV
A0556                                                                            END OF STANDARD LEAD INS.


 0557                   05,2003  3 7653 0  ENTER     CAF     ZERO
 0558                   05,2004  54 655 0            TS      CLPASS
 0559                   05,2005  3 4417 1            CAF     ENDINST
 0560                   05,2006  54 122 1            TS      ENTRET
 0561                   05,2007  10 653 0            CCS     REQRET
 0562                   05,2010  0 2031 1            TC      ENTPAS0             IF +, PASS 0
 0563                   05,2011  0 2031 1            TC      ENTPAS0             IF +, PASS 0
 0564                   05,2012  0 2013 1            TC      +1                  IF -, NOT PASS 0
 0565                   05,2013  3 6165 0            CAF     THREE               IF DEC, ALARM IF LESS THAN 5 CHAR IN,
 0566                   05,2014  7 0640 1            MASK    DECBRNCH            BUT LEAVE REQRET - AND FLASH ON, SO
 0567                   05,2015  10 000 0            CCS     A                   OPERATOR CAN SUPPLY MISSING NUMERICAL
 0568                   05,2016  0 2020 1            TC      +2                  CHARACTERS AND CONTINUE.
 0569                   05,2017  0 2024 0            TC      ACCEPTWD            OCTAL, ANY NUMBER OF CHAR OK.
 0570                   05,2020  10 637 1            CCS     DSPCOUNT
 0571                   05,2021  0 2324 0            TC      GODSPALM            LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0572                   05,2022  0 2324 0            TC      GODSPALM            LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0573                   05,2023  0 2024 0            TC      +1                  5 CHAR IN (DSPCOUNT IS -)
 0574                   05,2024  4 0653 0  ACCEPTWD  CS      REQRET              5 CHAR IN (DSPCOUNT IS -)
 0575                   05,2025  54 653 0            TS      REQRET              SET REQRET +.
 0576                   05,2026  0 4547 0            TC      FLASHOFF
 0577                   05,2027  0 0653 1            TC      REQRET

 0578                                0122  ENTEXIT   =       ENTRET

 0579                   05,2030   00030 1  LOWVERB   OCT     30                  LOWER VERB THAT AVOIDS NOUN TEST

 0580                   05,2031  3 7653 0  ENTPAS0   CAF     ZERO                 NOUN VERB SUB ENTERS HERE
 0581                   05,2032  54 640 1            TS      DECBRNCH
 0582                   05,2033  4 0641 0  TESTVB    CS      VERBREG             IF VERB IS 30-77, SKIP NOUN TEST
 0583                  05,2034  6 2030 0            AD       LOWVERB          30-VB
 0584                  05,2035  0 0006 1            EXTEND
 0585                  05,2036  6 2116 0            BZMF     VERBFAN          VERB G/E 30
 0586                  05,2037  0 0006 1  TESTNN    EXTEND                    VERB L/ 30
 0587                  05,2040  3 2076 1            DCA      LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
 0588                  05,2041  52 006 0            DXCH     Z                ROUTINE.
 0589                  05,2042  50 124 0            INDEX    MIXBR
 0590                  05,2043  0 2043 1            TC       +0
 0591                  05,2044  0 2046 1            TC       +2               NORMAL
 0592                  05,2045  0 2176 0            TC       MIXNOUN          MIXED
 0593                  05,2046  10 132 0            CCS      NNADTEM          NORMAL
 0594                  05,2047  0 2114 1            TC       VERBFAN -2             NORMAL  IF +
 0595                  05,2050  0 2324 0            TC       GODSPALM         NOT IN USE   IF +0
 0596                  05,2051  0 2055 0            TC       REQADD           SPECIFY MACHINE CADR IF -
 0597                  05,2052  24 657 0            INCR     NOUNCADR         AUGMENT MACHINE CADR IF -0
 0598                  05,2053  0 4436 1            TC       SETNADD          ECADR FROM NOUNCADR. SETS EB, NOUNADD.
 0599                  05,2054  0 2102 0            TC       INTMCTBS +2
 0600                  05,2055  3 7630 0  REQADD    CAF      BIT15            SET CLPASS FOR PASS0 ONLY
 0601                  05,2056  54 655 0            TS       CLPASS
 0602                  05,2057  4 4417 0            CS       ENDINST          TEST IF REACHED HERE FROM INTERNAL OR
 0603                  05,2060  6 0122 0            AD       ENTEXIT                   FROM EXTERNAL
 0604                  05,2061  0 0006 1            EXTEND
 0605                  05,2062  1 2064 0            BZF      +2               EXTERNAL MACH CADR TO BE SPECIFIED
 0606                  05,2063  0 2100 1            TC       INTMCTBS
 0607                  05,2064  0 2256 1            TC       REQDATZ          EXTERNAL MACH CADR TO BE SPECIFIED
 0608                  05,2065  10 640 1            CCS      DECBRNCH
 0609                  05,2066  0 2324 0            TC       GODSPALM         ALARM IF DECIMAL USED FOR MCTBS
 0610                  05,2067  56 645 0            XCH      ZREG             OCTAL USED    OK
 0611                  05,2070  0 4430 1            TC       SETNCADR         ECADR INTO NOUNCADR. SET EB, NOUNADD.
 0612                  05,2071  0 0006 1            EXTEND
 0613                  05,2072  3 2076 1            DCA      LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
 0614                  05,2073  52 006 0            DXCH     Z                ROUTINE.
 0615                  05,2074  0 2116 0            TC       VERBFAN

 0616                               E1              EBANK=   DSPCOUNT
 0617                  05,2075    02000 0  LODNNLOC 2CADR    LODNNTAB
C0617                  05,2076    14001 0
 06171                 05,2077    77772 0  NEG5     OCT      77772

 0618                  05,2100  3 0142 0  INTMCTBS  CA       MPAC     +2      INTERNAL MACH CADR TO BE SPECIFIED.
 0619                  05,2101  0 4430 1            TC       SETNCADR         ECADR INTO NOUNCADR. SET EB, NOUNADD.
 0620                  05,2102  4 7643 0            CS       BIT4             NVSUB CALL LEFT CADR IN MPAC+2 FOR MACH
 06201                 05,2103  7 0641 0            MASK     VERBREG          CADR TO BE SPECIFIED.
 06202                 05,2104  6 2077 0            AD       NEG5             MASKING MAKES VB15 LOOK LIKE VB05.
 06203                 05,2105  0 0006 1            EXTEND
 06204                 05,2106  1 2116 1            BZF      VERBFAN          VB = 05 OR 15. DO NOT DISPLAY CADR.
 06205                 05,2107  3 4446 0            CAF      R3D1             VB NOT = 05 OR 15, DISPLAY CADR.
 0621                  05,2110  54 637 1            TS       DSPCOUNT
 0622                  05,2111  3 0657 0            CA       NOUNCADR
 0623                  05,2112  0 3222 0            TC       DSPOCTWD
```

```
0624              05,2113  0 2116 0             TC      VERBFAN

0625              05,2114  6 7646 1             AD      ONE
0626              05,2115  0 4430 1             TC      SETNCADR        ECADR INTO NOUNCADR, SETS EB, NOUNADD.
0627              05,2116  4 2131 1  VERBFAN    CS      LST2CON
0628              05,2117  6 0641 1             AD      VERBREG         VERB-LST2CON
0629              05,2120  10 000 0             CCS     A
0630              05,2121  6 7646 1             AD      ONE             VERB G/ LST2CON
0631              05,2122  0 2124 1             TC      +2
0632              05,2123  0 2133 1             TC      VBFANDIR        VERB L/ LST2CON
0633              05,2124  54 140 0             TS      MPAC
0634              05,2125  0 4610 1             TC      RELDSP          RELEASE DISPLAY SYST
0635              05,2126  56 140 1             XCH     MPAC            ALSO TURN OFF RELEASE DISPLAY SYST LIGHT
0636              05,2127  6 2132 0             AD      LST2CADR
0637              05,2130  0 4105 1             TC      BANKJUMP
0638              05,2131    00040 0  LST2CON   OCT     40              FIRST LST2 VERB
0639              05,2132    11255 0  LST2CADR  CADR    DSPALARM        **FIX LATER**

0643              05,2133  50 641 1  VBFANDIR   INDEX   VERBREG
0644              05,2134  3 2136 1             CAF     VERBTAB
0645              05,2135  0 4105 1             TC      BANKJUMP

0646              05,2136    12324 1  VERBTAB   CADR    GODSPALM        VB00 ILLEGAL
0647              05,2137    12340 0            CADR    DSPA            VB01 DISPLAY OCT COMP 1 (R1)
0648              05,2140    12345 0            CADR    DSPB            VB02 DISPLAY OCT COMP 2 (R1)
0649              05,2141    12352 0            CADR    DSPC            VB03 DISPLAY OCT COMP 3 (R1)
0650              05,2142    12333 1            CADR    DSPAB           VB04 DISPLAY OCT COMP 1,2 (R1,R2)
0651              05,2143    12326 0            CADR    DSPABC          VB05 DISPLAY OCT COMP 1,2,3 (R1,R2,R3)
0652              05,2144    12445 1            CADR    DECDSP          VB06 DECIMAL DISPLAY
0653              05,2145    10662 1            CADR    DSPDPDEC        VB07 DP DECIMAL DISPLAY (R1,R2)
0654              05,2146    11255 0            CADR    DSPALARM        VB10 SPARE
0655              05,2147    13077 0            CADR    MONITOR         VB11 MONITOR OCT COMP 1 (R1)
0656              05,2150    13077 0            CADR    MONITOR         VB12 MONITOR OCT COMP 2 (R1)
0657              05,2151    13077 0            CADR    MONITOR         VB13 MONITOR OCT COMP 3 (R1)
0658              05,2152    13077 0            CADR    MONITOR         VB14 MONITOR OCT COMP 1,2 (R1,R2)
0659              05,2153    13077 0            CADR    MONITOR         VB15 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
0660              05,2154    13077 0            CADR    MONITOR         VB16 MONITOR DECIMAL
0661              05,2155    13077 0            CADR    MONITOR         VB17 MONITOR DP DEC  (R1,R2)
0662              05,2156    12324 1            CADR    GODSPALM        VB20 SPARE
0663              05,2157    12620 0            CADR    ALOAD           VB21 LOAD COMP 1 (R1)
0664              05,2160    12631 0            CADR    BLOAD           VB22 LOAD COMP 2 (R2)
0665              05,2161    12646 0            CADR    CLOAD           VB23 LOAD COMP 3 (R3)
0666              05,2162    12572 1            CADR    ABLOAD          VB24 LOAD COMP 1,2 (R1,R2)
0667              05,2163    12535 1            CADR    ABCLOAD         VB25 LOAD COMP 1,2,3 (R1,R2,R3)
0668              05,2164    12324 1            CADR    GODSPALM        VB26 SPARE
0669              05,2165    13214 1            CADR    DSPFMEM         VB27 FIXED MEMORY DISPLAY
A0670                                                                   THE FOLLOWING VERBS MAKE NO NOUN TEST
0671              05,2166    13314 0  REGEXLOC  CADR    VBRQEXEC        VB30 REQUEST EXECUTIVE
0672              05,2167    13340 1            CADR    VBRQWAIT        VB31 REQUEST WAITLIST
0673              05,2170    11303 1            CADR    BUMP            VB32 C(R2) INTO R3, C(R1) INTO R2
```

```
 0674                  05,2171   11266 0           CADR    VBPROC          VB33 PROCEED WITHOUT DATA
 0675                  05,2172   11273 1           CADR    VBTERM          VB34 TERMINATE CURRENT TEST OR LOAD REQ
 0676                  05,2173   13414 1           CADR    VBTSTLTS        VB35 TEST LIGHTS
 0677                  05,2174   02677 0           CADR    SLAP1           VB36 FRESH START
 0678                  05,2175   13267 0  ENDVBFAN CADR    MMCHANG         VB37 CHANGE MAJOR MODE


R0679    THE LIST2 VERBFAN IS LOCATED IN THE EXTENDED VERB BANK.
```

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R0680      NNADTAB CONTAINS A RELATIVE ADDRESS, IDADDREL(IN LOW 10 BITS), REFERRING
R0681      TO WHERE 3 CONSECUTIVE ADDRESSES ARE STORED (IN IDADDTAB).
R0682      MIXNOUN GETS DATA AND STORES IN MIXTEMP,+1,+2. IT SETS NOUNADD FOR
R0683       MIXTEMP.

 0685                         05,2176  10 132 0  MIXNOUN  CCS     NNADTEM
 0686                         05,2177  0 2203 1           TC      +4                 +  IN USE
 0687                         05,2200  0 2324 0           TC      GODSPALM           +0  NOT IN USE
 0688                         05,2201  0 2203 1           TC      +2                 -  IN USE
 0689                         05,2202  0 2203 1           TC      +1                 -0  IN USE
 0690                         05,2203  4 6162 0           CS      SIX
 0691                         05,2204  6 0641 1           AD      VERBREG
 0692                         05,2205  0 0006 1           EXTEND
 0693                         05,2206  6 2210 0           BZMF    +2                 VERB L/E 6
 0694                         05,2207  0 2116 0           TC      VERBFAN            AVOID MIXNOUN SWAP IF VB NOT = DISPLAY
 0695                         05,2210  3 7645 1           CAF     TWO
 0696                         05,2211  54 103 1  MIXNN1   TS      DECOUNT
 0697                         05,2212  6 2235 1           AD      MIXAD
 0698                         05,2213  54 131 0           TS      NOUNADD            SET NOUNADD TO MIXTEMP + K
 0699                         05,2214  50 103 0           INDEX   DECOUNT            GET IDADDTAB ENTRY FOR COMPONENT K
 0700                         05,2215  3 0134 1           CA      IDADITEM           OF NOUN.
 0701                         05,2216  54 106 1           TS      NOUNTEM
A0702                                                                                TEST FOR DP(FOR OCT DISPLAY). IF SO, GET
A0703                                                                                  MINOR PART ONLY.
 0704                         05,2217  0 2721 1           TC      SFRUTMIX           GET SF ROUT NUMBER IN A
 0706                         05,2220  0 2236 1           TC      DPTEST
 0707                         05,2221  0 2223 0           TC      MIXNN2             NO DP
 0708                         05,2222  24 106 0           INCR    NOUNTEM            DP  GET MINOR PART
 0709                         05,2223  3 0106 0  MIXNN2   CA      NOUNTEM
 0710                         05,2224  7 4503 1           MASK    LOW11              ESUBK (NO DP)  OR (ESUBK)+1    FOR DP
 0711                         05,2225  0 4440 0           TC      SETEBANK           SET EBANK, LEAVE EADRES IN A.
 0712                         05,2226  50 000 1           INDEX   A                  PICK UP C(ESUBK)  NOT DP
 0713                         05,2227  3 0000 1           CA      0                  OR C((ESUBK)+1)  FOR DP MINOR PART
 0714                         05,2230  50 131 1           INDEX   NOUNADD
 0715                         05,2231  56 000 1           XCH     0                  STORE IN MIXTEM + K
 0716                         05,2232  10 103 1           CCS     DECOUNT
 0717                         05,2233  0 2211 1           TC      MIXNN1
 0718                         05,2234  0 2116 0           TC      VERBFAN

 0719                         05,2235  0 0111 0  MIXAD    TC      MIXTEMP


R0720      DPTEST    ENTER WITH SF ROUT NUMBER IN A.
R0721                RETURNS TO L+1 IF NO DP.
R0722                RETURNS TO L+2 IF DP.

 0723                         05,2236  50 000 1  DPTEST   INDEX   A
 0724                         05,2237  1 2240 1           TCF     +1
 07241                        05,2240  0 0002 0           TC      Q                  OCTAL ONLY  NO DP
```

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       PINBALL GAME  BUTTONS AND LIGHTS                                                    USER'S OWN PAGE NO.  20

 0725                           05,2241  0 0002 0           TC      Q                    FRACT NO DP
 0726                           05,2242  0 0002 0           TC      Q                    DEG  NO DP
 0727                           05,2243  0 0002 0           TC      Q                    ARITH  NO DP
 0728                           05,2244  1 2250 0           TCF     DPTEST1              DP1OUT
 0729                           05,2245  1 2250 0           TCF     DPTEST1              DP2OUT
 0730                           05,2246  0 0002 0           TC      Q                    OPDEG  NO DP
 0731                           05,2247  1 2250 0           TCF     DPTEST1              DP3OUT
 0732                           05,2250  50 002 0  DPTEST1  INDEX   Q
 0733                           05,2251  0 0001 0           TC      1                    RETURN TO L+2


 0734                           05,2252  3 4444 1  REQDATX  CAF     R1D1
 0735                           05,2253  1 2257 1           TCF     REQCOM
 0736                           05,2254  3 4445 0  REQDATY  CAF     R2D1
 0737                           05,2255  1 2257 1           TCF     REQCOM
 0738                           05,2256  3 4446 0  REQDATZ  CAF     R3D1
 0739                           05,2257  54 637 1  REQCOM   TS      DSPCOUNT
 0740                           05,2260  4 0002 1           CS      Q
 0741                           05,2261  54 653 0           TS      REQRET
 0742                           05,2262  0 4063 0           TC      BANKCALL
 0743                           05,2263   10454 0           CADR    5BLANK
 0744                           05,2264  0 4543 1           TC      FLASHON
 0745                           05,2265  4 4417 0           CS      ENDINST
 0746                           05,2266  6 0122 0           AD      ENTEXIT
 0747                           05,2267  0 0006 1           EXTEND
 0748                           05,2270  1 2273 1           BZF     ENDRQDAT             ENTEXIT = ENDOFJOB. EXTERNALLY INITIATED
 0749                           05,2271  4 7653 1           CS      ZERO                 ENTEXIT NOT ENDOFJOB. NVSUB INITIATED
 0750                           05,2272  54 676 1           TS      CADRSTOR             NVSUB INITIATED LOAD. SET CADRSTOR TO -0
 0751                           05,2273  0 0122 0  ENDRQDAT TC      ENTEXIT

R0752  IF NVSUB INITIATED LOAD. SET CADRSTOR TO -0 TO TELL RECALTST TO RELEASE
R0753  DISPLAY IF ENDIDLE WAS NOT USED. (NECESSARY FOR DATAWAIT)


 0755                           05,2274  54 642 0           TS      NOUNREG
 0756                           05,2275  56 002 0  UPDATNN  XCH     Q
 0757                           05,2276  54 103 1           TS      UPDATRET
 0758                           05,2277  0 0006 1           EXTEND
 0759                           05,2300  3 2076 1           DCA     LODNNLOC             SWITCH BANKS TO NOUN TABLE READING
 0760                           05,2301  52 006 0           DXCH    Z                    ROUTINE.
 0761                           05,2302  10 132 0           CCS     NNADTEM
 0762                           05,2303  6 7646 1           AD      ONE                  NORMAL
 0763                           05,2304  1 2307 0           TCF     PUTADD
 0764                           05,2305  1 2310 0           TCF     PUTADD   +1          MCTBS  DONT CHANGE NOUNADD
 0765                           05,2306  1 2310 0           TCF     PUTADD   +1          MCTBI  DONT CHANGE NOUNADD
 0766                           05,2307  0 4430 1  PUTADD   TC      SETNCADR             ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 0767                           05,2310  3 4507 1           CAF     ND1
 0768                           05,2311  54 637 1           TS      DSPCOUNT
```

```
0769          05,2312   3 0642 1              CA      NOUNREG
0770          05,2313   1 2322 1              TCF     UPDAT1

0771          05,2314  54 641 0               TS      VERBREG
0772          05,2315  56 002 0   UPDATVB     XCH     Q
0773          05,2316  54 103 1               TS      UPDATRET
0774          05,2317   3 4506 0              CAF     VD1
0775          05,2320  54 637 1               TS      DSPCOUNT
0776          05,2321   3 0641 1              CA      VERBREG
0777          05,2322   0 3255 0  UPDAT1      TC      DSP2BIT
0778          05,2323   0 0103 0              TC      UPDATRET


0779          05,2324   0 4102 0  GODSPALM    TC      POSTJUMP
0780          05,2325    11255 0              CADR    DSPALARM
```

```
P0781              NOUN   TABLES
R0782   NOUN CODE L/ 55, NORMAL CASE.  NOUN CODE G/E 55, MIXED NOUN CASE.
R0783   FOR NORMAL CASE, NNADTAB CONTAINS ONE        ECADR     FOR EACH NOUN.
R0784   +0 INDICATES NOUN NOT USED.   - ENTRY INDICATES MACHINE CADR(E OR F) TO
R0785   BE SPECIFIED. -1 INDICATES CHANNEL TO BE SPECIFIED. -0 INDICATES AUGMENT
R07851  OF LAST MACHINE CADR SUPPLIED.

R0786   FOR MIXED CASE, NNADTAB CONTAINS ONE INDIRECT ADDRESS(IDADDREL) IN LOW
R0787   10 BITS, AND THE COMPONENT CODE NUMBER IN THE HIGH 5 BITS.

R0788   NNTYPTAB IS A PACKED TABLE OF THE FORM MMMMMNNNNNPPPPP.

R0789   FOR THE NORMAL CASE, M-S ARE THE COMPONENT CODE NUMBER.
R0790                        N-S ARE THE SF ROUTINE CODE NUMBER.
R0791                        P-S ARE THE SF CONSTANT CODE NUMBER.

R0792   MIXED CASE,M-S ARE THE SF CONSTANT3 CODE NUMBER     3 COMPONENT CASE
R0793              N-S ARE THE SF CONSTANT2 CODE NUMBER
R0794              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0795              N-S ARE THE SF CONSTANT2 CODE NUMBER     2 COMPONENT CASE
R0796              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0797              P-S ARE THE SF CONSTANT1 CODE NUMBER      1 COMPONENT CASE

R0798   THERE IS ALSO AN INDIRECT ADDRESS TABLE(IDADDTAB) FOR MIXED CASE ONLY.
R0799   EACH ENTRY CONTAINS ONE ECADR.    IDADDREL IS THE RELATIVE ADDRESS OF
R0800   THE FIRST OF THESE ENTRIES.
R0801   THERE IS ONE ENTRY IN THIS TABLE FOR EACH COMPONENT OF A MIXED NOUN
R0802   THEY ARE LISTED IN ORDER OF ASCENDING K.

R0803   THERE IS ALSO A SCALE FACTOR ROUTINE NUMBER TABLE( RUTMXTAB ) FOR MIXED
R0804   CASE ONLY. THERE IS ONE ENTRY PER MIXED NOUN. THE FORM IS,
R0805         QQQQQRRRRRSSSSS
R0806   Q-S ARE THE SF ROUTINE 3 CODE NUMBER     3 COMPONENT CASE
R0807   R-S ARE THE SF ROUTINE 2 CODE NUMBER
R0808   S-S ARE THE SF ROUTINE 1 CODE NUMBER
R0809   R-S ARE THE SF ROUTINE 2 CODE NUMBER     2 COMPONENT CASE
R0810   S-S ARE THE SF ROUTINE 1 CODE NUMBER


R0811   IN OCTAL DISPLAY AND LOAD (OCT OR DEC) VERBS, EXCLUDE USE OF VERBS WHOSE
R0812   COMPONENT NUMBER IS GREATER THAN THE NUMBER OF COMPONENTS IN NOUN.
R0813   ALL MACHINE ADDRESS TO BE SPECIFIED NOUNS ARE 1 COMPONENT.
R0814   ONLY EXCEPTION IS NOUN 01 TO ALLOW OCTAL DISPLAYS AND LOADS OF
R0815   AN UNCONTOLLED NUMBER OF COMPONENTS.


R0816   IN MULTI-COMPONENT LOAD VERBS, NO MIXING OF OCTAL AND DECIMAL DATA
R0817   COMPONENT WORDS IS ALLOWED. ALARM IF VIOLATION.
```

```
R0818   IN DECIMAL LOADS OF DATA, 5 NUMERICAL CHARACTERS MUST BE KEYED IN
R0819   BEFORE EACH ENTER. IF NOT, ALARM.
```

```
P0820               DISPLAY  VERBS
 0821                            05,2326   4 7645 0  DSPABC    CS      TWO
 0822                            05,2327   0 2376 1            TC      COMPTEST
 0823                            05,2330  50 131  1            INDEX   NOUNADD
 0824                            05,2331   4 0002 1            CS      2
 0825                            05,2332  56 116  1            XCH     BUF       +2
 0826                            05,2333   4 7646 0  DSPAB     CS      ONE
 0827                            05,2334   0 2376 1            TC      COMPTEST
 0828                            05,2335  50 131  1            INDEX   NOUNADD
 0829                            05,2336   4 0001 1            CS      1
 0830                            05,2337  56 115  1            XCH     BUF       +1
 0831                            05,2340   0 2420 0  DSPA      TC      TSTFORDP
 0832                            05,2341  50 131  1            INDEX   NOUNADD
 0833                            05,2342   4 0000 0            CS      0
 0834                            05,2343  56 114  0  DSPCOM1   XCH     BUF
 0835                            05,2344   0 2357 1            TC      DSPCOM2
 0836                            05,2345   4 7646 0  DSPB      CS      ONE
 0837                            05,2346   0 2376 1            TC      COMPTEST
 0838                            05,2347  50 131  1            INDEX   NOUNADD
 0839                            05,2350   4 0001 1            CS      1
 0840                            05,2351   0 2343 1            TC      DSPCOM1
 0841                            05,2352   4 7645 0  DSPC      CS      TWO
 0842                            05,2353   0 2376 1            TC      COMPTEST
 0843                            05,2354  50 131  1            INDEX   NOUNADD
 0844                            05,2355   4 0002 1            CS      2
 0845                            05,2356   0 2343 1            TC      DSPCOM1
 0846                            05,2357   4 7645 0  DSPCOM2   CS      TWO                      A  B  C  AB  ABC
 0847                            05,2360   6 0641 1            AD      VERBREG                  -1 -0 +1 +2  +3    IN A
 0848                            05,2361  10 000  0            CCS     A                        +0 +0 +0 +1  +2     IN A AFTER CCS
 0849                            05,2362   0 2365 0            TC      DSPCOM3
 0850                            05,2363   0 0122 0            TC      ENTEXIT
 0851                            05,2364   0 2365 0            TC      +1
 0852                            05,2365  54 106  1  DSPCOM3   TS      DISTEM                   +0,+1,+2 INTO DISTEM
 0853                            05,2366  50 000  1            INDEX   A
 0854                            05,2367   3 4444 1            CAF     R1D1
 0855                            05,2370  54 637  1            TS      DSPCOUNT
 0856                            05,2371  50 106  0            INDEX   DISTEM
 0857                            05,2372   4 0114 1            CS      BUF
 0858                            05,2373   0 3222 0            TC      DSPOCTWD
 0859                            05,2374  56 106  0            XCH     DISTEM
 0860                            05,2375   0 2361 1            TC      DSPCOM2 +2

R0861   COMPTEST ALARMS IF COMPONENT NUMBER OF VERB(LOAD OR OCT DISPLAY) IS
R0862   GREATER THAN THE HIGHEST COMPONENT NUMBER OF NOUN.
R0863   NOUN 01 IS EXCLUDED FROM TEST.
 0864                            05,2376  54 107  0  COMPTEST  TS      SFTEMP1                  - VERB COMP
 0865                            05,2377  22 002  0            LXCH    Q
 0866                            05,2400   4 7646 0  COMPTST1  CS      ONE
 0867                            05,2401   6 0642 1            AD      NOUNREG
 0868                            05,2402   0 0006 1            EXTEND
```

```
0869         05,2403  1 2417 0           BZF      NDCMPTST     NOUN = 01, ANY COMP OK
0870         05,2404  50 124 0           INDEX    MIXBR        NOUN NOT = 01.
0871         05,2405  3 2442 1           CAF      COMPICK -1
0872         05,2406  50 000 1           INDEX    A
0873         05,2407  3 0000 1           CA       0
0874         05,2410  7 4475 1           MASK     HI5
0875         05,2411  0 4456 1           TC       LEFT5        NOUN COMP
0876         05,2412  6 0107 1           AD       SFTEMP1      NOUN COMP - VERB COMP
0877         05,2413  10 000 0           CCS      A
0878         05,2414  0 0001 0           TC       L            NOUN COMP G/ VERB COMP
0879                     05,2416         LOC      +1
0880         05,2416  0 2324 0           TC       GODSPALM     NOUN COMP L/ VERB COMP
0881         05,2417  0 0001 0  NDCMPTST TC       L            NOUN COMP = VERB COMP


0882         05,2420  22 002 0  TSTFORDP LXCH     Q            TEST FOR DP. IF SO, GET MINOR PART ONLY.
08821        05,2421  3 0132 1           CA       NNADTEM
08822        05,2422  6 7646 1           AD       ONE          IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
08823        05,2423  0 0006 1           EXTEND
08824        05,2424  1 2436 0           BZF      CHANDSP
0883         05,2425  50 124 0           INDEX    MIXBR
0884         05,2426  0 2426 0           TC       +0
0885         05,2427  0 2431 0           TC       +2           NORMAL
0886         05,2430  0 0001 0           TC       L            MIXED CASE ALREADY HANDLED IN MIXNOUN
0887         05,2431  0 2713 0           TC       SFRUTNOR
0888         05,2432  0 2236 1           TC       DPTEST
0889         05,2433  0 0001 0           TC       L            NO DP
0890         05,2434  24 131 1           INCR     NOUNADD      DP    E+1 INTO NOUNADD FOR MINOR PART.
0891         05,2435  0 0001 0           TC       L


08911        05,2436  0 0006 1  CHANDSP  EXTEND
08912        05,2437  5 0657 0           INDEX    NOUNCADR
08913        05,2440  00 000 1           READ     0
08914        05,2441  4 0000 0           CS       A
08915        05,2442  1 2343 0           TCF      DSPCOM1


0892         05,2443    00133 0 COMPICK  ADRES    NNTYPTEM
0893         05,2444    00132 1          ADRES    NNADTEM

0894         05,2445  50 124 0  DECDSP   INDEX    MIXBR        NORMAL                 MIXED
0895         05,2446  3 2442 1           CAF      COMPICK -1   ADRES NNTYPTEM         ADRES NNADTEM
0896         05,2447  50 000 1           INDEX    A
0897         05,2450  3 0000 1           CA       0            C(NNTYPTEM)            C(NNADTEM)
0898         05,2451  7 4475 1           MASK     HI5          GET HI5 OF NNTYPTAB(NORM)OF NNADTAB(MIX)
0899         05,2452  0 4456 1           TC       LEFT5
```

```
 0900          05,2453  54 103 1            TS      DECOUNT        COMP NUMBER INTO DECOUNT
 0901          05,2454  54 106 1  DSPDCGET  TS      DECTEM         PICKS UP DATA
 0902          05,2455  6 0131 1            AD      NOUNADD        DECTEM  1COMP +0, 2COMP +1, 3COMP +2
 0903          05,2456  50 000 1            INDEX   A
 0904          05,2457  4 0000 0            CS      0
 0905          05,2460  50 106 0            INDEX   DECTEM
 0906          05,2461  56 643 0            XCH     XREG           CANT USE BUF SINCE DMP USES IT.
 0907          05,2462  10 106 1            CCS     DECTEM
 0908          05,2463  0 2454 0            TC      DSPDCGET       MORE TO GET
 0909          05,2464  3 7653 0  DSPDCPUT  CAF     ZERO           DISPLAYS DATA
 0910          05,2465  54 141 1            TS      MPAC     +1    DECOUNT 1COMP +0, 2COMP +1, 3COMP +2
 0911          05,2466  54 142 1            TS      MPAC     +2
 0912          05,2467  50 103 0            INDEX   DECOUNT
 0913          05,2470  3 4444 1            CAF     R1D1
 0914          05,2471  54 637 1            TS      DSPCOUNT
 0915          05,2472  50 103 0            INDEX   DECOUNT
 0916          05,2473  4 0643 1            CS      XREG
 0917          05,2474  54 140 0            TS      MPAC
 0918          05,2475  0 2734 0            TC      SFCONUM        2X( SF CON NUMB ) IN A
 0919          05,2476  54 107 0            TS      SFTEMP1
 0920          05,2477  0 0006 1            EXTEND                 SWITCH BANKS TO SF CONSTANT TABLE
 0921          05,2500  3 2512 0            DCA     GTSFOUTL         READING ROUTINE.
 0922          05,2501  52 006 0            DXCH    Z              LOADS SFTEMP1, SFTEMP2.
 0923          05,2502  50 124 0            INDEX   MIXBR
 0924          05,2503  0 2503 0            TC      +0
 0925          05,2504  0 2507 1            TC      DSPSFNOR
 0926          05,2505  0 2721 1            TC      SFRUTMIX
 0927          05,2506  0 2522 0            TC      DECDSP3

 0928          05,2507  0 2713 0  DSPSFNOR  TC      SFRUTNOR
 0929          05,2510  0 2522 0            TC      DECDSP3

 0930                          E1           EBANK=  DSPCOUNT
 0931          05,2511   02037 1  GTSFOUTL  2CADR   GTSFOUT
C0931          05,2512   14001 0


 0932          05,2513  0 4063 0  DSPDCEND  TC      BANKCALL       ALL SFOUT ROUTINES END HERE
 0933          05,2514   11057 0            CADR    DSPDECWD
 0934          05,2515  10 103 1            CCS     DECOUNT
 0935          05,2516  0 2520 1            TC      +2
 0936          05,2517  0 0122 0            TC      ENTEXIT
 0937          05,2520  54 103 1            TS      DECOUNT
 0938          05,2521  0 2464 0            TC      DSPDCPUT       MORE TO DISPLAY


 0940          05,2522  50 000 1  DECDSP3   INDEX   A
 0941          05,2523  3 2525 1            CAF     SFOUTABR
 0942          05,2524  0 4105 1            TC      BANKJUMP
```

```
0943                  05,2525   11255 0  SFOUTABR CADR    DSPALARM          ALARM IF DEC DISP WITH OCTAL ONLY NOUN
09431                 05,2526   12513 0           CADR    DSPDCEND
0944                  05,2527   10533 0           CADR    DEGOUTSF
0945                  05,2530   10620 1           CADR    ARTOUTSF
0946                  05,2531   10625 1           CADR    DP1OUTSF
0947                  05,2532   10632 1           CADR    DP2OUTSF
0948                  05,2533   10541 0           CADR    OPDEGOUT
0949                  05,2534   10634 1           CADR    DP3OUTSF
09491                           05,2535  ENDRTOUT EQUALS


R0950       THE FOLLOWING IS ATYPICAL SF ROUTINE . IT USES MPAC. LEAVES RESU
R0951  LTS IN MPAC, MPAC+1. ENDS WITH TC DSPDCEND


0952                            04,2533           SETLOC BLANKCON +1

R0953     DEGOUTSF SCALES BY .18 THE LOW 14 BITS OF ANGLE , ADDING .18 FOR
R0954  NUMBERS IN THE NEGATIVE (AGC) RANGE.

0955                  04,2533  3 7653 0  DEGOUTSF CAF     ZERO
0956                  04,2534  54 142 1           TS      MPAC     +2      SET INDEX FOR FULL SCALE
0957                  04,2535  0 2572 0           TC      FIXRANGE
0958                  04,2536  0 2540 1           TC      +2                NO AUGMENT NEEDED (SFTEMP1 AND 2 ARE 0)
0959                  04,2537  0 2565 0           TC      SETAUG            SET AUGMENTER ACCORDING TO C(MPAC +2)
0960                  04,2540  0 2603 0           TC      DEGCOM

R0961  OPDEGOUT SCALES BY .45 (THE RANGE IS 90 DEGREES) AND ADDS A 20 DEG BIAS.

0962                  04,2541  10 140 0  OPDEGOUT CCS     MPAC              RANGE IS 90 DEG
0963                  04,2542  56 140 1           XCH     MPAC              IF POS OR POS 0 THEN ADD BIAS AND
0964                  04,2543  0 2546 1           TC      +3                CORRECT FOR POSSIBLE OVERFLOW
0965                  04,2544  0 2555 0           TC      NEGOPT            IF NEG NON ZERO
0966                  04,2545  6 7655 0           AD      NEG1              IF NEG ZERO SUBTRACT 1
0967                  04,2546  6 2617 0           AD      20BIAS
0968                  04,2547  54 140 0  BIASCOM  TS      MPAC              TEST FOR OVERFLOW
0969                  04,2550  0 2553 0           TC      +3                NO OVFLOW
0970                  04,2551  3 7630 0           CAF     BIT15             IF OVFLOW
0971                  04,2552  26 140 0           ADS     MPAC
0972                  04,2553  3 7645 1           CAF     TWO               SET MULTIPLIER TO .45
0973                  04,2554  0 2534 1           TC      DEGOUTSF +1

0974                  04,2555  56 140 1  NEGOPT   XCH     MPAC              NEGATIVE CASE
0975                  04,2556  6 2617 0           AD      20BIAS
0976                  04,2557  10 000 0           CCS     A
0977                  04,2560  0 2547 0           TC      BIASCOM           IF POS THEN SUBTRACT 1 BECAUSE OF 2SCOM
0978                           04,2562            LOC     +1
0979                  04,2562  6 7646 1           AD      ONE               IF NEG RESTORE SUM
```

```
0980            04,2563  4 0000 0            COM                     IF NEG 0 LEAVE NEG 0
0981            04,2564  0 2547 0            TC      BIASCOM

0982            04,2565  0 0006 1  SETAUG    EXTEND                  LOADS SFTEMP1 AND SFTEMP2 WITH THE
0983            04,2566  5 0142 0            INDEX   MPAC     +2     DP AUGMENTER CONSTANT
0984            04,2567  3 2614 0            DCA     DEGTAB
0985            04,2570  52 110 0            DXCH    SFTEMP1
0986            04,2571  0 0002 0            TC      Q

0987            04,2572  10 140 0  FIXRANGE  CCS     MPAC            IF MPAC IS + RETURN TO L+1
0988            04,2573  0 0002 0            TC      Q               IF MPAC IS - RETURN TO L+2 AFTER
0989            04,2574  0 0002 0            TC      Q               MASKING OUT THE SIGN BIT
0990            04,2575  1 2576 0            TCF     +1
0991            04,2576  4 7630 1            CS      BIT15
0992            04,2577  7 0140 0            MASK    MPAC
0993            04,2600  54 140 0            TS      MPAC
0994            04,2601  50 002 0            INDEX   Q
0995            04,2602  0 0001 0            TC      1

0996            04,2603  0 0006 1  DEGCOM    EXTEND                  LOADS MULTIPLIER , DOES SHORTMP, AND
0997            04,2604  5 0142 0            INDEX   MPAC     +2     ADDS AUGMENTER.
0998            04,2605  3 2614 0            DCA     DEGTAB
0999            04,2606  52 141 1            DXCH    MPAC            ADJUSTED ANGLE IN A
1000            04,2607  0 7257 0            TC      SHORTMP
1001            04,2610  52 110 0            DXCH    SFTEMP1
1002            04,2611  20 141 1            DAS     MPAC
1003            04,2612  0 2623 1            TC      SCOUTEND


1004            04,2613   05605 1  DEGTAB    OCT     05605           HI PART OF     .18
1005            04,2614   03656 1            OCT     03656           LOW PART OF    .18
1006            04,2615   16314 0            OCT     16314           HI PART OF     .45
1007            04,2616   31463 1            OCT     31463           LO PART OF     .45

1008            04,2617   16040 1  20BIAS    OCT     16040           20 DEG BIAS FOR OPTICS

1009            04,2620  52 110 0  ARTOUTSF  DXCH    SFTEMP1         ASSUMES POINT AT LEFT OF DP SFCON
1010            04,2621  52 141 1            DXCH    MPAC
1011            04,2622  0 7257 0            TC      SHORTMP
1012            04,2623  0 4102 0  SCOUTEND  TC      POSTJUMP
1013            04,2624   12513 0            CADR    DSPDCEND

1016            04,2625  0 2637 1  DP1OUTSF  TC      DPOUT           SCALES MPAC, MPAC +1 BY DP SCALE FACTOR
1017            04,2626  56 142 0            XCH     MPAC     +2     IN SFTEMP1, SFTEMP2.  THEN SCALE RESULT
1018            04,2627  56 141 0            XCH     MPAC     +1     BY B14.
1019            04,2630  54 140 0            TS      MPAC
1020            04,2631  0 2623 1            TC      SCOUTEND
```

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        PINBALL GAME  BUTTONS AND LIGHTS                                                 USER'S OWN PAGE NO.  29

 1021                          04,2632  0 2637 1  DP2OUTSF TC       DPOUT              SCALES MPAC , MPAC +1 BY DP SCALE FACTOR
 1022                          04,2633  0 2623 1           TC       SCOUTEND


 1023                          04,2634  0 2637 1  DP3OUTSF TC       DPOUT              ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
 1027                          04,2635  0 3032 0           TC       TPLEFT7            PART OF SFCON. SHIFTS RESULTS LEFT 7.
 1028                          04,2636  0 2623 1           TC       SCOUTEND


R1029   DPOUT PICKS UP FRESH DATA FOR BOTH HI AND LO COMPONENTS.
R1030   THIS IS NEEDED FOR TIME DISPLAY.

 1032                          04,2637  56 002 0  DPOUT    XCH      Q
 1033                          04,2640  54 105 1           TS       OVFIND
 1034                          04,2641  50 124 0           INDEX    MIXBR
 1035                          04,2642  0 2642 0           TC       +0
 1036                          04,2643  0 2660 0           TC       DPOUTNOR
 1037                          04,2644  50 103 0           INDEX    DECOUNT            GET IDADDTAB ENTRY FOR COMPONENT K
 1038                          04,2645  3 0134 1           CA       IDADITEM               OF NOUN.
 1039                          04,2646  7 4503 1           MASK     LOW11              E SUBK
 1040                          04,2647  0 4440 0           TC       SETEBANK           SET EB, LEAVE EADRES IN A.
 1041                          04,2650  0 0006 1  DPOUTCOM EXTEND
 1042                          04,2651  5 0000 1           INDEX    A                  MIXED            NORMAL
 1043                          04,2652  3 0001 0           DCA      0                  C(ESUBK)         C(E)
 1044                          04,2653  52 141 1           DXCH     MPAC               C((E SUBK)+1)        C(E+1)
 1045                          04,2654  0 7062 1           TC       DMP
 1046                          04,2655   00107 1           ADRES    SFTEMP1
 1047                          04,2656  0 7226 0           TC       TPAGREE
 1048                          04,2657  0 0105 0           TC       OVFIND

 1049                          04,2660  3 0131 1  DPOUTNOR CA       NOUNADD            E
 1050                          04,2661  0 2650 0           TC       DPOUTCOM


R1051   THIS IS A SPECIAL PURPOSE VERB FOR DISPLAYING A DOUBLE PRECISION AGC
R1052   WORD AS 10 DECIMAL DIGITS ON THE AGC DISPLAY PANEL.  IT CAN BE USED WITH
R1053   ANY NOUN, EXCEPT MIXED NOUNS. IT DISPLAYS THE CONTENTS
R1054   OF THE REGISTER NOUNADD IS POINTING TO .  IF USED WITH NOUNS WHICH ARE
R1055   INHERENTLY NOT DP SUCH AS THE CDU COUNTERS THE DISPLAY WILL BE GARBAGE.
R1056   DISPLAY IS IN R1 AND R2 ONLY WITH THE SIGN IN R1.


 1058                          04,2662  50 124 0  DSPDPDEC INDEX    MIXBR
 1059                          04,2663  0 2663 0           TC       +0
 1060                          04,2664  0 2666 0           TC       +2                 NORMAL NOUN
 1061                          04,2665  0 3255 0           TC       DSPALARM
```

```
04,2666  0 0006 1           EXTEND
04,2667  5 0131 1           INDEX   NOUNADD
04,2670  3 0001 0           DCA     0
04,2671  52 141 1           DXCH    MPAC
04,2672  3 4444 1           CAF     R1D1
04,2673  54 637 1           TS      DSPCOUNT
04,2674  3 7653 0           CAF     ZERO
04,2675  54 142 1           TS      MPAC   +2
04,2676  0 7226 0           TC      TPAGREE
04,2677  0 3133 0           TC      DSP2DEC
04,2700  0 0122 0  ENDDPDEC TC      ENTEXIT
```

```
P1073          LOAD   VERBS


                          05,2535              SETLOC ENDRTOUT

                   05,2535  4 7645 0  ABCLOAD  CS     TWO
                   05,2536  0 2376 1           TC     COMPTEST
                   05,2537  3 2673 1           CAF    VBSP1LD
                   05,2540  0 2314 0           TC     UPDATVB  -1
                   05,2541  0 2252 0           TC     REQDATX
                   05,2542  3 2674 0           CAF    VBSP2LD
                   05,2543  0 2314 0           TC     UPDATVB  -1
                   05,2544  0 2254 0           TC     REQDATY
                   05,2545  3 2675 1           CAF    VBSP3LD
                   05,2546  0 2314 0           TC     UPDATVB -1
                   05,2547  0 2256 1           TC     REQDATZ


                   05,2550  4 6162 0  PUTXYZ   CS     SIX              TEST THAT THE 3 DATA WORDS LOADED ARE
                   05,2551  0 2676 1           TC     ALLDC/OC         ALL DEC OR ALL OCT.
                   05,2552  0 0006 1           EXTEND
                   05,2553  3 2076 1           DCA    LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
                   05,2554  52 006 0           DXCH   Z                ROUTINE.
                   05,2555  3 7653 0           CAF    ZERO             X COMP
                   05,2556  0 2762 0           TC     PUTCOM
                   05,2557  50 131 1           INDEX  NOUNADD
                   05,2560  54 000 0           TS     0
                   05,2561  3 7646 1           CAF    ONE              Y COMP
                   05,2562  0 2762 0           TC     PUTCOM
                   05,2563  50 131 1           INDEX   NOUNADD
                   05,2564  54 001 1           TS     1
                   05,2565  3 7645 1           CAF    TWO              Z COMP
                   05,2566  0 2762 0           TC     PUTCOM
                   05,2567  50 131 1           INDEX  NOUNADD
                   05,2570  54 002 1           TS     2
                   05,2571  0 2663 0           TC     LOADLV

                   05,2572  4 7646 0  ABLOAD   CS     ONE
                   05,2573  0 2376 1           TC     COMPTEST
                   05,2574  3 2673 1           CAF    VBSP1LD
                   05,2575  0 2314 0           TC     UPDATVB -1
                   05,2576  0 2252 0           TC     REQDATX
                   05,2577  3 2674 0           CAF    VBSP2LD
                   05,2600  0 2314 0           TC     UPDATVB -1
                   05,2601  0 2254 0           TC     REQDATY
                   05,2602  4 7225 1  PUTXY    CS     FIVE             TEST THAT THE 2 DATA WORDS LOADED ARE
                   05,2603  0 2676 1           TC     ALLDC/OC         ALL DEC OR ALL OCT.
                   05,2604  0 0006 1           EXTEND
```

```
05,2605  3 2076 1          DCA     LODNNLOC       SWITCH BANKS TO NOUN TABLE READING
05,2606  52 006 0          DXCH    Z              ROUTINE.
05,2607  3 7653 0          CAF     ZERO           X COMP
05,2610  0 2762 0          TC      PUTCOM
05,2611  50 131 1          INDEX   NOUNADD
05,2612  54 000 0          TS      0
05,2613  3 7646 1          CAF     ONE            Y COMP
05,2614  0 2762 0          TC      PUTCOM
05,2615  50 131 1          INDEX   NOUNADD
05,2616  54 001 1          TS      1
05,2617  0 2663 0          TC      LOADLV

05,2620  0 2252 0  ALOAD   TC      REQDATX
05,2621  0 0006 1          EXTEND
05,2622  3 2076 1          DCA     LODNNLOC       SWITCH BANKS TO NOUN TABLE READING
05,2623  52 006 0          DXCH    Z              ROUTINE.
05,2624  3 7653 0          CAF     ZERO           X COMP
05,2625  0 2762 0          TC      PUTCOM
05,2626  50 131 1          INDEX   NOUNADD
05,2627  54 000 0          TS      0
05,2630  0 2663 0          TC      LOADLV

05,2631  4 7646 0  BLOAD   CS      ONE
05,2632  0 2376 1          TC      COMPTEST
05,2633  3 7630 0          CAF     BIT15          SET CLPASS FOR PASS0 ONLY
05,2634  54 655 0          TS      CLPASS
05,2635  0 2254 0          TC      REQDATY
05,2636  0 0006 1          EXTEND
05,2637  3 2076 1          DCA     LODNNLOC       SWITCH BANKS TO NOUN TABLE READING
05,2640  52 006 0          DXCH    Z              ROUTINE.
05,2641  3 7646 1          CAF     ONE
05,2642  0 2762 0          TC      PUTCOM
05,2643  50 131 1          INDEX   NOUNADD
05,2644  54 001 1          TS      1
05,2645  0 2663 0          TC      LOADLV

05,2646  4 7645 0  CLOAD   CS      TWO
05,2647  0 2376 1          TC      COMPTEST
05,2650  3 7630 0          CAF     BIT15          SET CLPASS FOR PASS0 ONLY
05,2651  54 655 0          TS      CLPASS
05,2652  0 2256 1          TC      REQDATZ
05,2653  0 0006 1          EXTEND
05,2654  3 2076 1          DCA     LODNNLOC       SWITCH BANKS TO NOUN TABLE READING
05,2655  52 006 0          DXCH    Z              ROUTINE.
05,2656  3 7645 1          CAF     TWO
05,2657  0 2762 0          TC      PUTCOM
05,2660  50 131 1          INDEX   NOUNADD
05,2661  54 002 1          TS      2
05,2662  0 2663 0          TC      LOADLV
```

```
05,2663  3 7653 0  LOADLV    CAF     ZERO
05,2664  54 640 1            TS      DECBRNCH
05,2665  4 7653 1            CS      ZERO
05,2666  54 654 1            TS      LOADSTAT
05,2667  4 4506 1            CS      VD1              TO BLOCK NUMERICAL CHARACTERS AND
05,2670  54 637 1            TS      DSPCOUNT         CLEARS AFTER A COMPLETED LOAD
05,2671  0 4102 0            TC      POSTJUMP         AFTER COMPLETED LOAD, GO TO RECALTST
05,2672   11400 0            CADR    RECALTST         TO SEE IF THERE IS RECALL FROM ENDIDLE.

05,2673   00021 1  VBSP1LD   OCT     21               VB21 = ALOAD
05,2674   00022 1  VBSP2LD   OCT     22               VB22 = BLOAD
05,2675   00023 0  VBSP3LD   OCT     23               VB23 = CLOAD



05,2676  54 103 1  ALLDC/OC  TS      DECOUNT          TESTS THAT DATA WORDS LOADED ARE EITHER
05,2677  4 0640 1            CS      DECBRNCH         ALL DEC OR ALL OCT, ALARMS IF NOT.
05,2700  54 021 0            TS      SR
05,2701  4 0021 0            CS      SR
05,2702  4 0021 0            CS      SR               SHIFTED RIGHT 2
05,2703  10 000 0            CCS     A                DEC COMP BITS IN LOW 3
05,2704  1 2706 0            TCF     +2               SOME ONES IN LOW 3
05,2705  0 0002 0            TC      Q                ALL ZEROS, ALL OCTAL.  OK
05,2706  6 0103 0            AD      DECOUNT          DEC COMP = 7 FOR 3COMP, =6 FOR 2COMP
05,2707  0 0006 1            EXTEND                   (BUT IT HAS BEEN DECREMENTED BY CCS)
05,2710  1 2712 0            BZF     +2               MUST MATCH 6 FOR 3COMP, 5 FOR 2COMP.
05,2711  0 2324 0            TC      GODSPALM
05,2712  0 0002 0  GOQ       TC      Q                ALL REQUIRED ARE DEC, OK


05,2713  56 002 0  SFRUTNOR  XCH     Q                GETS SF ROUTINE NUMBER FOR NORMAL CASE
05,2714  54 100 1            TS      EXITEM           CANT USE L FOR RETURN. TSTFORDP USES L.
05,2715  3 4474 1            CAF     MID5
05,2716  7 0133 1            MASK    NNTYPTEM
05,2717  0 4447 1            TC      RIGHT5
05,2720  0 0100 0            TC      EXITEM           SF ROUTINE NUMBER IN A

05,2721  56 002 0  SFRUTMIX  XCH     Q                GETS SF ROUTINE NUMBER FOR MIXED CASE
05,2722  54 100 1            TS      EXITEM
05,2723  50 103 0            INDEX   DECOUNT
05,2724  3 2753 1            CAF     DISPLACE         PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
05,2725  54 001 1            TS      L
05,2726  50 103 0            INDEX   DECOUNT
05,2727  3 4473 0            CAF     LOW5             LOW5, MID5, OR HI5 IN A
05,2730  7 0137 0            MASK    RUTMXTEM         GET HI5, MID5, OR LOW5 OF RUTMXTAB ENTRY
05,2731  50 001 0            INDEX   L
05,2732  0 0000 1            TC      0
DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
05,2733  0 0100 0  SFRET1    TC      EXITEM           SF ROUTINE NUMBER IN A
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 1204                  05,2734  56 002 0  SFCONUM   XCH     Q              GETS 2X( SF CONSTANT NUMBER)
 1205                  05,2735  54 100 1            TS      EXITEM
 1206                  05,2736  50 124 0            INDEX   MIXBR
 1207                  05,2737  0 2737 0            TC      +0
 1208                  05,2740  0 2756 1            TC      CONUMNOR       NORMAL NOUN
 1209                  05,2741  50 103 0            INDEX   DECOUNT        MIXED NOUN
 1210                  05,2742  3 2753 1            CAF     DISPLACE
 1211                  05,2743  54 001 1            TS      L              PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1212                  05,2744  50 103 0            INDEX   DECOUNT
 1213                  05,2745  3 4473 0            CAF     LOW5
 1214                  05,2746  7 0133 1            MASK    NNTYPTEM
 1215                  05,2747  50 001 0            INDEX   L
 1216                  05,2750  0 0000 1            TC      0
R1217  DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1218                  05,2751  6 0000 1  SFRET     DOUBLE                 2X(SF CONSTANT NUMBER ) IN A
 1219                  05,2752  0 0100 0            TC      EXITEM

 1220                  05,2753  0 2712 1  DISPLACE  TC      GOQ
 1221                  05,2754  0 4447 1            TC      RIGHT5
 1222                  05,2755  0 4456 1            TC      LEFT5

 1223                  05,2756  3 4473 0  CONUMNOR  CAF     LOW5           NORMAL NOUN ALWAYS GETS LOW 5 OF
 1224                  05,2757  7 0133 1            MASK    NNTYPTEM       NNTYPTAB FOR SF CONUM.
 1225                  05,2760  6 0000 1            DOUBLE
 1226                  05,2761  0 0100 0            TC      EXITEM         2X( SF CONSTANT NUMBER) IN A



 1227                  05,2762  54 103 1  PUTCOM    TS      DECOUNT
 1228                  05,2763  56 002 0            XCH     Q
 1229                  05,2764  54 101 0            TS      DECRET
 1230                  05,2765  3 7653 0            CAF     ZERO
 1231                  05,2766  54 105 1            TS      OVFIND
 1232                  05,2767  50 103 0            INDEX   DECOUNT
 1233                  05,2770  56 646 0            XCH     XREGLP
 1234                  05,2771  54 141 1            TS      MPAC   +1
 1235                  05,2772  50 103 0            INDEX   DECOUNT
 1236                  05,2773  56 643 0            XCH     XREG
 1237                  05,2774  54 140 0            TS      MPAC
 1238                  05,2775  50 124 0            INDEX   MIXBR
 1239                  05,2776  0 2776 0            TC      +0
 1240                  05,2777  0 3023 0            TC      PUTNORM        NORMAL NOUN
R1241  IF MIXNOUN, PLACE ADDRESS FOR COMPONENT K INTO NOUNADD, SET EBANK BITS.
 1242                  05,3000  50 103 0            INDEX   DECOUNT        GET IDADDTAB ENTRY FOR COMPONENT K
 1243                  05,3001  3 0134 1            CA      IDADITEM            OF NOUN.
 1244                  05,3002  7 4503 1            MASK    LOW11          (ECADR)SUBK FOR CURRENT COMP OF NOUN
 1247                  05,3003  0 4430 1            TC      SETNCADR       ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 12471                 05,3004  0 0006 1            EXTEND                 C(NOUNADD) IN A UPON RETURN
 12472                 05,3005  60 103 0            SU      DECOUNT        PLACE (ESUBK)-K INTO NOUNADD
 12473                 05,3006  54 131 0            TS      NOUNADD
 1248                 05,3007  10 640 1            CCS      DECBRNCH
 1249                 05,3010  0 3051 0            TC       PUTDECSF           +  DEC
 1250                 05,3011  0 2721 1            TC       SFRUTMIX           +0  OCTAL
 1251                 05,3012  0 2236 1            TC       DPTEST
 1252                 05,3013  0 3040 0            TC       PUTCOM2            NO DP
A1253                                                                          TEST FOR DP SCALE FOR OCT LOAD. IF SO,
A1254                                                                          +0 INTO MAJOR PART. SET NOUNADD FOR
A1255                                                                          LOADING OCTAL WORD INTO MINOR PART.
 1256                 05,3014  24 131 1  PUTDPCOM  INCR     NOUNADD            DP  (ESUBK)-K+1  OR  E+1
 1257                 05,3015  3 0131 1            CA       NOUNADD            NOUNADD NOW SET FOR MINOR PART
 1258                 05,3016  26 103 1            ADS      DECOUNT            (ESUBK)+1  OR  E+1  INTO DECOUNT
 1259                 05,3017  3 7653 0            CAF      ZERO               NOUNADD SET FOR MINOR PART
 1260                 05,3020  50 103 0            INDEX    DECOUNT
 1261                 05,3021  53 777 0            TS       0        -1        ZERO MAJOR PART(ESUBK OR E)
 1262                 05,3022  0 3040 0            TC       PUTCOM2

 1263                 05,3023  0 4436 1  PUTNORM   TC       SETNADD            ECADR FROM NOUNCADR. SETS EB, NOUNADD.
 1264                 05,3024  10 640 1            CCS      DECBRNCH
 1265                 05,3025  0 3051 0            TC       PUTDECSF           +  DEC
 1266                 05,3026  0 2713 0            TC       SFRUTNOR           +0  OCTAL
 1267                 05,3027  0 2236 1            TC       DPTEST
 1268                 05,3030  0 3034 0            TC       PUTCOM2 -4         NO DP
 1269                 05,3031  3 7653 0            CAF      ZERO               DP
 1270                 05,3032  54 103 1            TS       DECOUNT
 1271                 05,3033  0 3014 1            TC       PUTDPCOM

 12711                05,3034  3 0132 1            CA       NNADTEM
 12712                05,3035  6 7646 1            AD       ONE                IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 12713                05,3036  0 0006 1            EXTEND
 12714                05,3037  1 3044 0            BZF      CHANLOAD
 1272                 05,3040  56 140 1  PUTCOM2   XCH      MPAC
 1273                 05,3041  0 0101 1            TC       DECRET

 1274                               E1             EBANK=   DSPCOUNT
 1275                 05,3042   02045 1  GTSFINLC  2CADR    GTSFIN
C1275                 05,3043   14001 0


 12751                05,3044  56 140 1  CHANLOAD  XCH      MPAC
 12752                05,3045  0 0006 1            EXTEND
 12753                05,3046  5 0657 0            INDEX    NOUNCADR
 12754                05,3047  01 000 0            WRITE    0
 12755                05,3050  0 2663 0            TC       LOADLV


R1276   PUTDECSF FINDS MIXBR AND DECOUNT STILL SET FROM PUTCOM

 1277                 05,3051  0 2734 0  PUTDECSF  TC       SFCONUM            2X(SF CON NUMB) IN A
 1278                 05,3052  54 107 0            TS       SFTEMP1
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         PINBALL GAME  BUTTONS AND LIGHTS                                                USER'S OWN PAGE NO.  36

 1279                         05,3053  0 0006 1             EXTEND                       SWITCH BANKS TO SF CONSTANT TABLE
 1280                         05,3054  3 3043 0             DCA      GTSFINLC            READING ROUTINE.
 1281                         05,3055  52 006 0             DXCH     Z                   LOADS SFTEMP1, SFTEMP2.
 1282                         05,3056  50 124 0             INDEX    MIXBR
 1283                         05,3057  0 3057 0             TC       +0
 1284                         05,3060  0 3063 1             TC       PUTSFNOR
 1285                         05,3061  0 2721 1             TC       SFRUTMIX
 1286                         05,3062  0 3064 0             TC       PUTDCSF2
 1287                         05,3063  0 2713 0   PUTSFNOR  TC       SFRUTNOR

 1288                         05,3064  50 000 1   PUTDCSF2  INDEX    A
 1289                         05,3065  3 3067 0             CAF      SFINTABR
 1290                         05,3066  0 4105 1             TC       BANKJUMP            SWITCH BANKS FOR EXPANSHION ROOM
 1291                         05,3067   11255 0   SFINTABR  CADR     DSPALARM            ALARM IF DEC LOAD WITH OCTAL ONLY NOUN
 12911                        05,3070   10761 0             CADR     BINROUND
 1292                         05,3071   10701 0             CADR     DEGINSF
 1293                         05,3072   10751 0             CADR     ARTHINSF
 1294                         05,3073   11001 0             CADR     DPINSF
 1295                         05,3074   11026 0             CADR     DPINSF2
 1296                         05,3075   10764 0             CADR     OPTDEGIN
 1297                         05,3076   11001 0             CADR     DPINSF              SAME AS ARITHDP1
 12971                                05,3077   ENDRUTIN  EQUALS


R1298    SCALE FACTORS FOR THOSE ROUTINES NEEDING THEM ARE AVAILABLE IN SFTEMP1.
R1299    ALL SFIN ROUTINES USE MPAC MPAC+1. LEAVE RESULT IN A. END WITH TC DECRET


 1300                                 04,2701             SETLOC ENDDPDEC +1

R1301    DEGINSF APPLIES 1000/180 =5.55555(10) = 5.43434(8)

 1302                         04,2701  0 7062 1   DEGINSF   TC       DMP                 SF ROUTINE FOR DEC DEGREES
 1303                         04,2702   02744 1             ADRES    DEGCON1             MULT BY 5.5  5(10)X2EXP-3
 1304                         04,2703  10 141 1             CCS      MPAC     +1         THIS ROUNDS OFF MPAC+1 BEFORE SHIFT
 1305                         04,2704  3 7634 1             CAF      BIT11               LEFT 3, AND CAUSES 360.00 TO OF/UF
 1306                         04,2705  0 2707 0             TC       +2                  WHEN SHIFTED LEFT AND ALARM.
 1307                         04,2706  4 7634 0             CS       BIT11
 1308                         04,2707  6 0141 0             AD       MPAC     +1
 1309                         04,2710  0 3044 1             TC       2ROUND   +2
 1310                         04,2711  0 4532 1             TC       TPSL1               LEFT 1
 1311                         04,2712  0 4532 1   DEGINSF2  TC       TPSL1               LEFT 2
 1312                         04,2713  0 3053 1             TC       TESTOFUF
 1313                         04,2714  0 4532 1             TC       TPSL1               RETURNS IF NO OF/UF (LEFT3)
 1314                         04,2715  10 140 0             CCS      MPAC
 1315                         04,2716  0 2722 1             TC       SIGNFIX             IF+, GO TO SIGNFIX
 1316                         04,2717  0 2722 1             TC       SIGNFIX             IF +0, GO TO SIGNFIX
 1317                         04,2720  4 0000 0             COM                          IF - , USE -MAGNITUDE +1
 1318          04,2721  54 140 0             TS     MPAC               IF -0, USE +0
 1319          04,2722  10 105 1  SIGNFIX    CCS    OVFIND
 1320          04,2723   0 2740 0            TC     SGNTO1             IF OVERFLOW
 1321          04,2724   0 2734 0            TC     ENDSCALE           NO OVERFLOW/UNDERFLOW
 1322          04,2725  10 140 0             CCS    MPAC               IF UF FORCE SIGN TO 0 EXCEPT -180
 1323                     04,2727            LOC    +1
 1324          04,2727   0 2736 1            TC     NEG180
 1325          04,2730   0 2731 0            TC     +1
 1326          04,2731  56 140 1             XCH    MPAC
 1327          04,2732   7 7626 0            MASK   POSMAX
 1328          04,2733  54 140 0             TS     MPAC
 1329          04,2734   0 4102 0  ENDSCALE   TC     POSTJUMP
 1330          04,2735    13040 1            CADR   PUTCOM2

 1331          04,2736   4 7626 0  NEG180     CS     POSMAX
 1332          04,2737   0 2733 1            TC     ENDSCALE  -1

 1333          04,2740   4 0140 0  SGNTO1     CS     MPAC               IF OF FORCE SIGN TO 1
 1334          04,2741   7 7626 0            MASK   POSMAX
 1335          04,2742   4 0000 0            CS     A
 1336          04,2743   0 2733 1            TC     ENDSCALE  -1

 1337          04,2744    26161 0  DEGCON1    2DEC   5.555555555 B-3
C1337          04,2745    30707 1
 1338          04,2746    21616 0  DEGCON2    2DEC   2.222222222 B-2
C1338          04,2747    07071 0
 1339          04,2750    71527 1  NEG.2      OCT    -06250             = .197753906  I.E. THE BIAS SCALED

 1341          04,2751   0 7062 1  ARTHINSF   TC     DMP                SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
 1342          04,2752    00107 1            ADRES  SFTEMP1            ASSUMES POINT BETWEEN HI AND LO PARTS
 1343          04,2753  56 142 0             XCH    MPAC     +2        OF SFCON. SHIFTS RESULTS LEFT BY 14.
 1344          04,2754  56 141 0             XCH    MPAC     +1        (BY TAKING RESULTS FROM MPAC+1, MPAC+2)
 1345          04,2755  56 140 1             XCH    MPAC
 1346          04,2756   0 0006 1            EXTEND
 1347          04,2757   1 2761 1            BZF    BINROUND
 1348          04,2760   0 3255 0            TC     DSPALARM           TOO LARGE A LOAD
 1349          04,2761   0 3042 1  BINROUND   TC     2ROUND
 1350          04,2762   0 3053 1            TC     TESTOFUF
 1351          04,2763   0 2734 0            TC     ENDSCALE           RETURNS IF NO OF/UF


 1352          04,2764  10 140 0  OPTDEGIN   CCS    MPAC               OPTICS SCALING ROUTINE
 1353          04,2765   0 2771 1            TC     +4
 1354          04,2766   0 2771 1            TC     +3
 1355          04,2767   0 3255 0            TC     DSPALARM           REJECT NEGATIVE INPUT
 1356          04,2770   0 3255 0            TC     DSPALARM                 DITTO
 1357          04,2771   3 2750 1  OPDEGIN2   CAF    NEG.2              RANGE IS 90 DEG
 1358          04,2772  26 140 0             ADS    MPAC               SUBTRACT BIAS
 1359          04,2773   0 7062 1            TC     DMP                MULT BY 100 / 45  B-2
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        PINBALL GAME  BUTTONS AND LIGHTS                                                               USER'S OWN PAGE NO.  38

1360                        04,2774   02746 0            ADRES   DEGCON2
1361                        04,2775  3 7633 0            CAF     BIT12                     ROUND AS IN DEGINSF
1362                        04,2776  6 0141 0            AD      MPAC      +1
1363                        04,2777  0 3044 1            TC      2ROUND    +2
1364                        04,3000  0 2712 1            TC      DEGINSF2

1365                        04,3001  0 7062 1  DPINSF    TC      DMP                       SCALES MPAC, MPAC +1 BY SFTEMP1,
1366                        04,3002   00107 1            ADRES   SFTEMP1                   SFTEMP2.  STORES LOW PART OF RESULT
1367                        04,3003  56 142 0            XCH     MPAC      +2              IN (E SUBK) +1 OR E+1
1368                        04,3004  6 0000 1            DOUBLE
1369                        04,3005  54 142 1            TS      MPAC      +2
1370                        04,3006  3 7653 0            CAF     ZERO
1371                        04,3007  6 0141 0            AD      MPAC      +1
1372                        04,3010  0 3044 1            TC      2ROUND    +2
1373                        04,3011  0 3053 1            TC      TESTOFUF
1374                        04,3012  50 124 0            INDEX   MIXBR                     RETURNS IF NO OF/UF
1375                        04,3013  0 3013 0            TC      +0
1376                        04,3014  0 3024 1            TC      DPINORM
1377                        04,3015  3 0103 0            CA      DECOUNT                   MIXEDNOUN
1378                        04,3016  6 0131 1  DPINCOM   AD      NOUNADD                      MIXED                     NORMAL
1379                        04,3017  54 002 1            TS      Q                           E SUBK                E
1380                        04,3020  56 141 0            XCH     MPAC      +1
1381                        04,3021  50 002 0            INDEX   Q
1382                        04,3022  54 001 1            TS      1                         PLACE LOW PART IN
1383                        04,3023  0 2734 0            TC      ENDSCALE                  (E SUBK) +1     MIXED
1384                        04,3024  3 7653 0  DPINORM   CAF     ZERO                      E +1            NORMAL
1385                        04,3025  0 3016 0            TC      DPINCOM


1386                        04,3026  0 7062 1  DPINSF2   TC      DMP                       ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
1387                        04,3027   00107 1            ADRES   SFTEMP1                   PART OF SF CONST. DPINSF2 SHIFTS RESULTS
1388                        04,3030  0 3032 0            TC      TPLEFT7                   LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1,
1389                        04,3031  0 3003 1            TC      DPINSF    +2


1390                        04,3032  56 002 0  TPLEFT7   XCH     Q                         OPERATES ON MPAC, MPAC+1, MPAC+2
1391                        04,3033  54 110 0            TS      SFTEMP2                   CANT USE L FOR RETURN. TPSL1 USES L.
1392                        04,3034  3 6162 1            CAF     SIX                       LEFT BY 7
1393                        04,3035  54 107 0  LEFT7COM  TS      SFTEMP1
1394                        04,3036  0 4532 1            TC      TPSL1
1395                        04,3037  10 107 0            CCS     SFTEMP1
1396                        04,3040  0 3035 1            TC      LEFT7COM
1397                        04,3041  0 0110 1            TC      SFTEMP2


1398                        04,3042  56 141 0  2ROUND    XCH     MPAC      +1
1399                        04,3043  6 0000 1            DOUBLE
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04,3044  54 141 1            TS    MPAC     +1
04,3045  0 0002 0            TC    Q                  IF MPAC+1 DOES NOT OF/UF
04,3046  6 0140 1            AD    MPAC
04,3047  54 140 0            TS    MPAC
04,3050  0 0002 0            TC    Q                  IF MPAC DOES NOT OF/UF
04,3051  54 105 1            TS    OVFIND
04,3052  0 0002 0  2RNDEND   TC    Q


04,3053  10 105 1  TESTOFUF  CCS   OVFIND             RETURNS IF NO OF/UF
04,3054  0 3255 0            TC    DSPALARM           OF
04,3055  0 0002 0            TC    Q
04,3056  0 3255 0            TC    DSPALARM           UF
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P1411    MONITOR ALLOWS OTHER KEYBOARD ACTIVITY. IT IS ENDED BY VERB TERMINATE,
R1412    ANY NVSUB CALL THAT PASSES THE DSPLOCK, OR ANOTHER MONITOR.

R1413    MONITOR ACTION IS SUSPENDED, BUT NOT ENDED, BY ANY KEYBOARD ACTION,
R1414    EXCEPT ERROR LIGHT RESET. IT BEGINS AGAIN WHEN KEY RELEASE IS PERFORMED.
R1415    MONITOR SAVES THE NOUN AND APPROPRIATE DISPLAY VERB IN MONSAVE. IT SAVES
R1416    NOUNCADR IN MONSAVE1, IF NOUN = MACHINE CADR TO BE SPECIFIED. BIT 15 OF
R1417    MONSAVE1 IS THE KILL MONITOR SIGNAL (KILLER BIT).

R1418    MONSAVE INDICATES IF MONITOR IS ON(+=ON, +0=OFF)
R1419    IF MONSAVE IS +, MONITOR ENTERS NO REQUEST, BUT TURNS KILLER BIT OFF.
R1420    IF MONSAVE IS +0, MONITOR ENTERS REQUEST AND TURNS KILLER BIT OFF.

R1421    NVSUB AND VB=TERMINATE TURN KILL MONITOR BIT ON.

R1422    IF KILLER BIT IS ON, MONREQ ENTERS NO FURTHER REQUESTS, ZEROS MONSAVE
R1423    AND MONSAVE1 (TURNING OFF KILLER BIT).


R1424    MONITOR DOSENT TEST FOR MATBS SINCE NVSUB CAN HANDLE INTERNAL MATBS NOW
 1425                         05,3077             SETLOC ENDRUTIN

 1426                 05,3077  4 7630 1  MONITOR  CS      BIT15
 1427                 05,3100  7 0657 1           MASK    NOUNCADR
 1428                 05,3101  54 141 1  MONIT1   TS      MPAC      +1     TEMP STORAGE
 1429                 05,3102  3 3401 1           CAF     LOW6
 1430                 05,3103  7 0641 0           MASK    VERBREG
 1431                 05,3104  0 4456 1           TC      LEFT5
 1432                 05,3105  54 022 0           TS      CYL
 1433                 05,3106  56 022 1           XCH     CYL
 1434                 05,3107  6 0642 1           AD      NOUNREG
 1435                 05,3110  54 140 0           TS      MPAC             TEMP STORAGE
 1436                 05,3111  4 0677 0           CS      GRABLOCK         NEITHER CASE SEARCHES LIST.
 1437                 05,3112  6 7645 1           AD      TWO
 1438                 05,3113  10 000 0           CCS     A
 1439                 05,3114  0 4633 0           TC      RELDSP1          GRABLOCK=0,1. +0 INTO DSPLOCK AND
 1440                 05,3115  0 3121 0           TC      +4               TURN OFF KEY RLSE LIGHT.
 1441                         05,3117             LOC     +1
 1442                 05,3117  3 7653 0           CAF     ZERO             GRABLOCK=2. +0 INTO DSPLOCK AND
 1443                 05,3120  54 652 1           TS      DSPLOCK          LEAVE KEY RLSE LIGHT ALONE
 1444                 05,3121  0 0004 0           INHINT
 1445                 05,3122  10 660 0           CCS     MONSAVE
 1446                 05,3123  0 3130 0           TC      +5               IF MONSAVE WAS +, NO REQUEST
 1447                 05,3124  3 7646 1           CAF     ONE              IF MONSAVE WAS 0, REQUEST MONREQ
 1448                 05,3125  0 4251 0           TC      WAITLIST
 1449                               E1            EBANK=  DSPCOUNT
 1450                 05,3126   03134 1           2CADR   MONREQ
C1450                 05,3127   12001 0
 1451                 05,3130  52 141 1           DXCH    MPAC             PLACE MONITOR VERB AND NOUN INTO MONSAVE
 1452            05,3131  52 661 1           DXCH    MONSAVE          ZERO THE KILL MONITOR BIT
 1453            05,3132  0 0003 1           RELINT
 1454            05,3133  0 0122 0           TC      ENTRET



 1455            05,3134  0 4526 1  MONREQ   TC      LODSAMPT         CALLED BY WAITLIST
 1456            05,3135  10 661 1           CCS     MONSAVE1         TIME IS SNATCHED IN RUPT FOR NOUN 65
 1457            05,3136  0 3142 0           TC      +4               IF KILLER BIT = 0, ENTER REQUESTS
 1458            05,3137  0 3142 0           TC      +3               IF KILLER BIT = 0, ENTER REQUESTS
 1459            05,3140  0 3153 0           TC      KILLMON          IF KILLER BIT = 1, NO REQUESTS
 1460            05,3141  0 3153 0           TC      KILLMON          IF KILLER BIT = 1, NO REQUESTS
 1461            05,3142  3 3157 1           CAF     MONDEL
 1462            05,3143  0 4251 0           TC      WAITLIST         ENTER WAITLIST REQUEST FOR MONREQ
 1463                           E1           EBANK=  DSPCOUNT
 1464            05,3144   03134 1           2CADR   MONREQ
C1464            05,3145   12001 0
 1465            05,3146  3 4502 1           CAF     CHRPRIO
 1466            05,3147  0 4131 0           TC      NOVAC            ENTER EXEC REQUEST FOR MONDO
 1467                           E1           EBANK=  DSPCOUNT
 1468            05,3150   03160 0           2CADR   MONDO
C1468            05,3151   12001 0
 1469            05,3152  0 4321 0           TC      TASKOVER

 1470            05,3153  3 7653 0  KILLMON  CAF     ZERO             ZERO MONSAVE AND TURN KILLER BIT OFF
 1471            05,3154  54 660 0           TS      MONSAVE
 1472            05,3155  54 661 1           TS      MONSAVE1         TURN OFF KILL MONITOR BIT.
 1473            05,3156  0 4321 0           TC      TASKOVER


 1474            05,3157   00144 0  MONDEL   OCT     144              FOR 1 SEC MONITOR INTERVALS


 1475            05,3160  10 661 1  MONDO    CCS     MONSAVE1         CALLED BY EXEC
 1476            05,3161  0 3165 0           TC      +4               IF KILLER BIT = 0, CONTINUE
 1477            05,3162  0 3165 0           TC      +3               IF KILLER BIT = 0, CONTINUE
 1478            05,3163  0 4205 1           TC      ENDOFJOB         IN CASE TERMINATE CAME SINCE LAST MONREQ
 1479            05,3164  0 4205 1           TC      ENDOFJOB         IN CASE TERMINATE CAME SINCE LAST MONREQ
 1480            05,3165  10 652 1           CCS     DSPLOCK
 1481            05,3166  0 3212 0           TC      MONBUSY          NVSUB IS BUSY
 1482            05,3167  3 3401 1           CAF     LOW6             NVSUB IS AVAILABLE
 1483            05,3170  7 0660 0           MASK    MONSAVE
 1484            05,3171  54 107 0           TS      NVTEMP
 1485            05,3172  0 4372 0           TC      NVSUBMON         PLACE NOUN INTO NOUNREG AND DISPLAY IT
 1486            05,3173  0 4205 1           TC      ENDOFJOB         IN CASE OF ALARM DURING DISPLAY
 1487            05,3174  3 3210 1           CAF     MONMASK
 1488            05,3175  7 0660 0           MASK    MONSAVE          CHANGE MONITOR VERB TO DISPLAY VERB
 1489            05,3176  0 4447 1           TC      RIGHT5
```

```
05,3177  54 020 1             TS      CYR
05,3200  56 020 0             XCH     CYR
05,3201  54 641 0             TS      VERBREG
05,3202  3 3211 0             CAF     MONBACK           SET RETURN TO PASTEVB AFTER DATA DISPLAY
05,3203  54 122 1             TS      ENTRET
05,3204  4 7630 1             CS      BIT15
05,3205  7 0661 1             MASK    MONSAVE1          PUT ECADR INTO MPAC +2. INTMCTBS WILL
05,3206  54 142 1             TS      MPAC     +2       DISPLAY IT AND SET NOUNCADR, NOUNADD,
05,3207  0 2037 1   ENDMONDO  TC      TESTNN            EBANK.

                 4347         SETLOC  ENDT4FF

   4347  3 4355 0   PASTEVB   CAF     MIDSIX
   4350  7 0660 0             MASK    MONSAVE
   4351  54 107 0             TS      NVTEMP            PLACE MONITOR VERB INTO VERBREG AND
   4352  0 4372 0             TC      NVSUBMON               DISPLAY IT.
   4353  0 4354 1             TC      +1                IN CASE OF ALARM DURING DISPLAY
   4354  0 4205 1   ENDPASTE  TC      ENDOFJOB

   4355   07700 1   MIDSIX    OCTAL   07700



              05,3210         SETLOC  ENDMONDO +1
05,3210   00700 0   MONMASK   OCT     700
05,3211   04347 0   MONBACK   ADRES   PASTEVB

05,3212  0 4522 0   MONBUSY   TC      RELDSPON          TURN KEY RELEASE LIGHT
05,3213  0 4205 1             TC      ENDOFJOB


DSPFMEM IS USED TO DISPLAY (IN OCTAL) ANY FIXED REGISTER.
IT IS USED WITH NOUN = MACHINE CADR TO BE SPECIFIED. THE FCADR OF THE
DESIRED LOCATION IS THEN PUNCHED IN. IT HANDLES F/F ( FCADR 4000-7777)

05,3214  3 4444 1   DSPFMEM   CAF     R1D1              IF F/F, DATACALL USES BANK 02 OR 03.
05,3215  54 637 1             TS      DSPCOUNT
05,3216  3 0657 0             CA      NOUNCADR          ORIGINAL FCADR LOADED STILL IN NOUNCADR.
05,3217  0 4116 0             TC      DATACALL
05,3220  0 3222 0             TC      DSPOCTWD
05,3221  0 4205 1             TC      ENDOFJOB
```

```
       DSPDECWD CONVERTS C(MPAC) AND C(MPAC +1)TO A SIGN AND 5 CHAR DECIMAL
       STARTING IN LOC SPECIFIED IN DSPCOUNT

                         04,3057                SETLOC TESTOFUF +4

                   04,3057   56 002 0  DSPDECWD XCH    Q                 USES SHORTMP THROUGHOUT
                   04,3060   54 101 0           TS     WDRET             CANT USE L FOR RETURN.+ON USES L.
                   04,3061   10 140 0           CCS    MPAC
                   04,3062   0 3071 1           TC     +7
                   04,3063   0 3071 1           TC     +6
                   04,3064   6 7646 1           AD     ONE
                   04,3065   54 140 0           TS     MPAC
                   04,3066   0 2313 1           TC     -ON
                   04,3067   4 0141 1           CS     MPAC  +1
                   04,3070   0 3073 0           TC     +3
                   04,3071   0 2273 0           TC     +ON
                   04,3072   56 141 0           XCH    MPAC    +1
                   04,3073   6 3132 1           AD     DECROUND
                   04,3074   54 141 1           TS     MPAC    +1
                   04,3075   3 7653 0           CAF    ZERO
                   04,3076   6 0140 1           AD     MPAC
                   04,3077   54 140 0           TS     MPAC
                   04,3100   0 3104 1           TC     +4
                   04,3101   3 7626 1           CAF    POSMAX
                   04,3102   54 140 0           TS     MPAC
                   04,3103   54 141 1           TS     MPAC    +1
                   04,3104   3 7644 0           CAF    FOUR
                   04,3105   54 123 0  DSPDCWD1 TS     WDCNT
                   04,3106   3 4511 0           CAF    BINCON
                   04,3107   0 7257 0           TC     SHORTMP
                   04,3110   50 140 1  TRACE1   INDEX  MPAC
                   04,3111   3 4333 0           CAF    RELTAB
                   04,3112   7 4473 1           MASK   LOW5
                   04,3113   54 110 0           TS     CODE
                   04,3114   3 7653 0           CAF    ZERO
                   04,3115   56 142 0           XCH    MPAC    +2
                   04,3116   56 141 0           XCH    MPAC    +1
                   04,3117   54 140 0           TS     MPAC
                   04,3120   56 637 0           XCH    DSPCOUNT
                   04,3121   54 127 1  TRACE1S  TS     COUNT
                   04,3122   10 000 0           CCS    A                 DECREMENT DSPCOUNT EXCEPT AT +0
                   04,3123   54 637 1           TS     DSPCOUNT
                   04,3124   0 3157 1           TC     DSPIN
                   04,3125   10 123 0           CCS    WDCNT
                   04,3126   0 3105 0           TC     DSPDCWD1
                   04,3127   4 4506 1           CS     VD1
                   04,3130   54 637 1           TS     DSPCOUNT
                   04,3131   0 0101 1           TC     WDRET

                   04,3132    02476 0  DECROUND OCT    02476
```

```
R1568     DSP2DEC CONVERTS C(MPAC) AND C(MPAC+1) INTO A SIGN AND 10 CHAR DECIMAL
R1569     STARTING IN THE LOC SPECIFIED IN DSPCOUNT.

 1570                          04,3133  56 002 0  DSP2DEC  XCH    Q
 1571                          04,3134  54 101 0           TS     WDRET             MUST USE SAME RETURN AS DSPDECWD
 1572                          04,3135  3 7653 0           CAF    ZERO
 1573                          04,3136  54 110 0           TS     CODE
 1574                          04,3137  3 6165 0           CAF    THREE
 1575                          04,3140  0 3241 0           TC     11DSPIN           -R2 OFF
 1576                          04,3141  3 7644 0           CAF    FOUR
 1577                          04,3142  0 3241 0           TC     11DSPIN           +R2 OFF
 1578                          04,3143  10 140 0           CCS    MPAC
 1579                          04,3144  0 3154 1           TC     +8D
 1580                          04,3145  0 3154 1           TC     +7
 1581                          04,3146  6 7646 1           AD     ONE
 1582                          04,3147  54 140 0           TS     MPAC
 1583                          04,3150  0 2313 1           TC     -ON
 1584                          04,3151  4 0141 1           CS     MPAC   +1
 1585                          04,3152  54 141 1           TS     MPAC   +1
 1586                          04,3153  0 3155 0           TC     +2
 1587                          04,3154  0 2273 0           TC     +ON
 1588                          04,3155  3 4445 0           CAF    R2D1
 1589                          04,3156  0 3105 0  END2DEC  TC     DSPDCWD1


 1590                                   05,3222            SETLOC DSPFMEM +6
R1591     DSPOCTWD DISPLAYS C(A) UPON ENTRY AS A 5 CHAR OCT STARTING IN THE DSP
R1592     CHAR SPECIFIED IN DSPCOUNT. IT STOPS AFTER 5 CHAR HAVE BEEN DISPLAYED.

 1593                          05,3222  54 022 0  DSPOCTWD TS     CYL
 1594                          05,3223  56 002 0           XCH    Q
 1595                          05,3224  54 101 0           TS     WDRET             MUST USE SAME RETURN AS DSP2BIT.
 1596                          05,3225  3 7631 1           CAF    BIT14             TO BLANK SIGNS
 1597                          05,3226  26 637 1           ADS    DSPCOUNT
 1598                          05,3227  3 7644 0           CAF    FOUR
 1599                          05,3230  54 123 0  WDAGAIN  TS     WDCNT
 1600                          05,3231  4 0022 0           CS     CYL
 1601                          05,3232  4 0022 0           CS     CYL
 1602                          05,3233  4 0022 0           CS     CYL
 1603                          05,3234  4 0000 0           CS     A
 1604                          05,3235  7 7652 0           MASK   DSPMSK
 1605                          05,3236  50 000 1           INDEX  A
 1606                          05,3237  3 4333 0           CAF    RELTAB
 1607                          05,3240  7 4473 1           MASK   LOW5
 1608                          05,3241  54 110 0           TS     CODE
 1609                          05,3242  56 637 0           XCH    DSPCOUNT
 1610                          05,3243  54 127 1           TS     COUNT
 1611                          05,3244  10 000 0           CCS    A                 DECREMENT DSPCOUNT EXCEPT AT +0
 1612                          05,3245  54 637 1           TS     DSPCOUNT
```

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         PINBALL GAME  BUTTONS AND LIGHTS                                                    USER'S OWN PAGE NO.  45

 1613                             05,3246  0 4102 0             TC       POSTJUMP
 1614                             05,3247    11247 0            CADR     DSPOCTIN
 1615                             05,3250  10 123 0  OCTBACK    CCS      WDCNT
 1616                             05,3251  0 3230 0             TC       WDAGAIN                    +
 1617                             05,3252  4 4506 1  DSPLV      CS       VD1                        TO BLOCK NUMERICAL CHARACTERS, CLEARS,
 1618                             05,3253  54 637 1             TS       DSPCOUNT                   AND SIGNS AFTER A COMPLETED DISPLAY.
 1619                             05,3254  0 0101 1             TC       WDRET

 1620                                          7652  DSPMSK     =        SEVEN


R1622    DSP2BIT DISPLAYS C(A) UPON ENTRY AS A 2 CHAR OCT BEGINNING IN THE DSP
R1623    LOC SPECIFIED IN DSPCOUNT BY PRE CYCLING RIGHT C(A) AND USING THE LOGIC
R1624    OF THE 5 CHAR OCTAL DISPLAY

 1625                             05,3255  54 020 1  DSP2BIT    TS       CYR
 1626                             05,3256  56 002 0             XCH      Q
 1627                             05,3257  54 101 0             TS       WDRET                      CANT USE L AS RETURN. UPDATNN USES L.
 1628                             05,3260  3 7646 1             CAF      ONE
 1629                             05,3261  54 123 0             TS       WDCNT
 1630                             05,3262  4 0020 1             CS       CYR
 1631                             05,3263  4 0020 1             CS       CYR
 1632                             05,3264  56 020 0             XCH      CYR
 1633                             05,3265  54 022 0             TS       CYL
 1634                             05,3266  0 3235 0             TC       WDAGAIN +5


R1635    FOR DSPIN PLACE 0/25 OCT INTO COUNT, 5 BIT RELAY CODE INTO CODE. BOTH
R1636    ARE DESTROYED. IF BIT14 OF COUNT IS 1, SIGN IS BLANKED WITH LEFT CHAR.
R1637    FOR DSPIN1 PLACE 0,1 INTO BIT11 OF CODE, 2 INTO COUNT, REL ADDRESS OF
R1638    DSPTAB ENTRY INTO DSREL.

 1639                                       04,3157             SETLOC   END2DEC  +1

 1640                             04,3157  56 002 0  DSPIN      XCH      Q                          CANT USE L FOR RETURN, SINCE MANY OF THE
 1641                             04,3160  54 100 1             TS       DSEXIT                     ROUTINES CALLING DSPIN USE L AS RETURN.
 1642                             04,3161  3 4473 0             CAF      LOW5
 1643                             04,3162  7 0127 1             MASK     COUNT
 1644                             04,3163  54 021 0             TS       SR
 1645                             04,3164  56 021 1             XCH      SR
 1646                             04,3165  54 125 0             TS       DSREL
 1647                             04,3166  3 7646 1             CAF      BIT1
 1648                             04,3167  7 0127 1             MASK     COUNT
 1649                             04,3170  10 000 0             CCS      A
 1650                             04,3171  0 3173 1             TC       +2                         LEFT IF COUNT IS ODD
 1651                             04,3172  0 3203 0             TC       DSPIN1  -1                 RIGHT IF COUNT IS EVEN
 1652                             04,3173  56 110 1             XCH      CODE
 1653                             04,3174  0 4465 1             TC       SLEFT5                     DOES NOT USE CYL
 1654             04,3175   54 110 0             TS       CODE
 1655             04,3176   3 7631 1             CAF      BIT14
 1656             04,3177   7 0127 1             MASK     COUNT
 1657             04,3200   10 000 0             CCS      A
 1658             04,3201   3 7645 1             CAF      TWO             BIT14 = 1, BLANK SIGN
 1659             04,3202   6 7646 1             AD       ONE             BIT14 = 0, LEAVE SIGN ALONE
 1660             04,3203   54 127 1             TS       COUNT           +0 INTO COUNT FOR RIGHT
A1661                                                                     +1 INTO COUNT FOR LEFT(SIGN LEFT ALONE)
A1662                                                                     +3 INTO COUNT FOR LEFT(TO BLANK SIGN)
 1663             04,3204   0 0004 0   DSPIN1    INHINT
 1664             04,3205   50 125 1             INDEX    DSREL
 1665             04,3206   10 662 1             CCS      DSPTAB
 1666             04,3207   0 3211 0             TC       +2              IF +
 1667                         04,3211            LOC      +1
 1668             04,3211   6 7646 1             AD       ONE             IF-
 1669             04,3212   54 126 0             TS       DSMAG
 1670             04,3213   50 127 0             INDEX    COUNT
 1671             04,3214   7 3235 1             MASK     DSMSK
 1672             04,3215   0 0006 1             EXTEND
 1673             04,3216   60 110 1             SU       CODE
 1674             04,3217   0 0006 1             EXTEND
 1675             04,3220   1 3233 1             BZF      DSLV            SAME
 1676             04,3221   50 127 0   DFRNT     INDEX    COUNT
 1677             04,3222   4 3235 1             CS       DSMSK           MASK WITH 77740,76037, OR 75777
 1678             04,3223   7 0126 0             MASK     DSMAG
 1679             04,3224   6 0110 1             AD       CODE
 1680             04,3225   4 0000 0             CS       A
 1681             04,3226   50 125 1             INDEX    DSREL
 1682             04,3227   56 662 0             XCH      DSPTAB
 1683             04,3230   0 0006 1             EXTEND
 1684             04,3231   6 3233 0             BZMF     DSLV            DSPTAB ENTRY WAS -
 1685             04,3232   24 656 1             INCR     NOUT            DSPTAB ENTRY WAS +
 1686             04,3233   0 0003 1   DSLV      RELINT
 1687             04,3234   0 0100 0             TC       DSEXIT

 1688             04,3235    00037 0   DSMSK     OCT      37
 1689             04,3236    01740 0             OCT      1740
 1690             04,3237    02000 0             OCT      2000
 1691             04,3240    03740 1             OCT      3740


R1692      FOR 11DSPIN, PUT REL ADDRESSS OF DSPTAB ENTRY INTO A, 1 IN BIT11 OR 0 IN
R1693      BIT11 OF CODE.

 1694             04,3241   54 125 0   11DSPIN   TS       DSREL
 1695             04,3242   3 7645 1             CAF      TWO
 1696             04,3243   54 127 1             TS       COUNT
 1697             04,3244   56 002 0             XCH      Q               MUST USE SAME RETURN AS DSPIN
 1698             04,3245   54 100 1             TS       DSEXIT
 1699                  04,3246  0 3204 1           TC      DSPIN1


 1700                  04,3247  0 3157 1  DSPOCTIN TC      DSPIN             SO DSPOCTWD DOESNT USE SWCALL
 1701                  04,3250  3 3252 1           CAF     +2
 1702                  04,3251  0 4105 1           TC      BANKJUMP
 1703                  04,3252    13250 1  ENDSPOCT CADR    OCTBACK


R1704   DSPALARM FINDS TC NVSUBEND IN ENTRET FOR NVSUB INITIATED ROUTINES.
R1705   ABORT WITH 01501.
R1706   DSPALARM FINDS TC ENDOFJOB IN ENTRET FOR KEYBOARD INITIATED ROUTINES.
R1707   DO TC ENTRET.

 1708                  04,3253  3 4417 1  CHARALRM CAF     ENDINST           ALARMS WHICH MUST DO ENDOFJOBS COME
 1709                  04,3254  54 122 1           TS      ENTRET            HERE. ALLOWS ENTRET TO BE TEMP ERASABLE

 1710                  04,3255  0 4512 0  DSPALARM TC      FALTON            TURN ON OPERATOR ERROR LIGHT
 1711                  04,3256  4 3265 1           CS      NVSBENDL
 1712                  04,3257  6 0122 0           AD      ENTEXIT
 1713                  04,3260  0 0006 1           EXTEND
 17131                 04,3261  1 3263 1           BZF     +2                NVSUB INITIATED. ABORT
 17132                 04,3262  0 0122 0           TC      ENTEXIT           NOT NVSUB INITIATED.
 17133                 04,3263  0 4662 1           TC      ABORT
 17134                 04,3264    01501 1           OCT     01501
 17135                 04,3265  0 4376 1  NVSBENDL TC      NVSUBEND


R1714   MMCHANG USES NOUN DISPLAY UNTIL ENTER. THEN IT USES MODE DISP.
R1715   IT GOES TO MODROUT WITH THE NEW M M CODE IN A, BUT NOT DISPLAYED IN
R1716   M M LIGHTS.

 1717                           05,3267            SETLOC DSP2BIT  +10D

 1718                  05,3267  0 3302 0  MMCHANG  TC      REQMM
 1719                  05,3270  3 7653 0           CAF     ZERO
 1720                  05,3271  56 642 1           XCH     NOUNREG
 1721                  05,3272  54 140 0           TS      MPAC
 1722                  05,3273  3 4507 1           CAF     ND1
 17221                 05,3274  54 637 1           TS      DSPCOUNT
 1723                  05,3275  0 4063 0           TC      BANKCALL
 1724                  05,3276    10517 0           CADR    2BLANK
 1725                  05,3277  3 0140 1           CA      MPAC
 1726                  05,3300  0 4102 0           TC      POSTJUMP
 1727                  05,3301    11255 0           CADR    MODROUTB          GO THRU STANDARD LOC.
```

```
                 04,3255  MODROUTB =       DSPALARM         **FIX LATER**
      05,3302  4 0002 1   REQMM    CS      Q
      05,3303  54 653 0            TS      REQRET
      05,3304  3 4507 1            CAF     ND1
      05,3305  54 637 1            TS      DSPCOUNT
      05,3306  3 7653 0            CAF     ZERO
      05,3307  54 642 0            TS      NOUNREG
      05,3310  0 4063 0            TC      BANKCALL
      05,3311   10517 0            CADR    2BLANK
      05,3312  0 4543 1            TC      FLASHON
      05,3313  0 0122 0            TC      ENTEXIT


VBRQEXEC ENTERS REQUEST TO EXEC     FOR ANY ADDRESS WITH ANY PRIORITY.
IT DOES ENDOFJOB AFTER ENTERING REQUEST. DISPLAY SYST IS RELEASED.
IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
COMPONENT 1  PRIORITY(BITS 10-14) BIT1=0 FOR NOVAC, BIT1=1 FOR FINDVAC.
COMPONENT 2  JOB ADRES (12 BIT )
COMPONENT 3  BBCON

      05,3314  3 7646 1   VBRQEXEC CAF     BIT1
      05,3315  7 0706 1            MASK    DSPTEM1
      05,3316  10 000 0            CCS     A
      05,3317  0 3336 1            TC      SETVAC           IF BIT1 = 1, FINDVAC
      05,3320  3 4476 0            CAF     TCNOVAC          IF BIT1 = 0, NOVAC
      05,3321  54 140 0   REQEX1   TS      MPAC             TC NOVAC  OR  TC FINDVAC INTO MPAC
      05,3322  4 7646 0            CS      BIT1
      05,3323  7 0706 1            MASK    DSPTEM1
      05,3324  54 144 1            TS      MPAC     +4      PRIO INTO MPAC+4 AS A TEMP
      05,3325  0 4610 1   REQUESTC TC      RELDSP
      05,3326  3 4417 1            CA      ENDINST
      05,3327  54 143 0            TS      MPAC     +3      TC ENDOFJOB INTO MPAC+3
      05,3330  0 0006 1            EXTEND
      05,3331  3 0710 1            DCA     DSPTEM1  +1      JOB ADRES INTO MPAC+1
      05,3332  52 142 1            DXCH    MPAC     +1      BBCON INTO MPAC+2
      05,3333  3 0144 0            CA      MPAC     +4      PRIO IN A
      05,3334  0 0004 0            INHINT
      05,3335  0 0140 1            TC      MPAC

      05,3336  3 4501 1   SETVAC   CAF     TCFINDVC
      05,3337  0 3321 1            TC      REQEX1

VBRQWAIT ENTERS REQUEST TO WAITLIST FOR ANY ADDRESS WITH ANY DELAY.
IT DOES ENDOFJOB AFTER ENTERING REQUEST.DISPLAY SYST IS RELEASED.
IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
COMPONENT 1  DELAY (LOW BITS)
COMPONENT 2  TASK ADRES (12 BIT)
COMPONENT 3  BBCON
```

```
 1773                    05,3340  3 4477 1  VBRQWAIT CAF     TCWAIT
 1774                    05,3341  54 140 0           TS      MPAC            TC WAITLIST INTO MPAC
 1775                    05,3342  3 0706 0           CA      DSPTEM1         TIME DELAY
 1776                    05,3343  0 3324 1  ENDRQWT  TC      REQUESTC -1

R1777   REQUESTC WILL PUT TASK ADRES INTO MPAC+1, BBCON INTO MPAC+2,
R1778   TC ENDOFJOB INTO MPAC+3. IT WILL TAKE TIME DELAY OUT OF MPAC+4 AND
R1779   LEAVE IT IN A, INHINT AND TC MPAC.


 17791                            04,3266            SETLOC  NVSBENDL +1
 1780                    04,3266  3 7646 1  VBPROC   CAF     ONE             PROCEED WITHOUT DATA
 1781                    04,3267  54 654 1           TS      LOADSTAT
 1782                    04,3270  0 4610 1           TC      RELDSP
 1783                    04,3271  0 4547 0           TC      FLASHOFF
 1784                    04,3272  0 3400 0           TC      RECALTST        SEE IF THERE IS ANY RECALL FROM ENDIDLE


 1785                    04,3273  0 4400 1  VBTERM   TC      KILMONON        TURN ON KILL MONITOR BIT
 1786                    04,3274  4 7646 0           CS      ONE
 1787                    04,3275  0 3267 1           TC      VBPROC  +1      TERM VERB SETS LOADSTAT NEG


R1788   FLASH IS TURNED OFF ONLY BY PROCEED WITHOUT DATA, TERMINATE, END OF LOAD


R1789   VBRELDSP TURNS OFF RELEASE DISPLAY SYSTEM LIGHT(AND SEARCHES LIST ONLY
R1790   IF THIS LIGHT WAS TURNED ON BY NVSUBUSY), AND TURNS OFF UPACT LIGHT.

 1791                    04,3276  4 7644 1  VBRELDSP CS      BIT3
 1792                    04,3277  0 0006 1           EXTEND
 1793                    04,3300  03 011 1           WAND    DSALMOUT        TURN OFF UPACT LIGHT
 1794                    04,3301  0 4610 1           TC      RELDSP          SEARCHES LIST
 1795                    04,3302  0 4205 1           TC      ENDOFJOB


R1796   BUMP SHIFTS WORD DISPLAYED IN R2 TO R3, R1 TO R2. IT BLANKS R1.

 1797                    04,3303  3 7225 0  BUMP     CAF     FIVE            R2D5
 1798                    04,3304  54 637 1           TS      DSPCOUNT
 1799                    04,3305  54 127 1           TS      COUNT
 1800                    04,3306  3 7646 1           CAF     ONE             SHIFT DATA OF R2 TO R3, R1 TO R2
 1801                    04,3307  7 0127 1           MASK    COUNT
 1802                    04,3310  56 127 0           XCH     COUNT           +0 INTO COUNT IF EVEN (RIGHT)
 1803                    04,3311  54 021 0           TS      SR              +1 INTO COUNT IF ODD (LEFT)
```

```
04,3312  56 021 1            XCH    SR           DSREL IN A
04,3313  50 000 1            INDEX  A
04,3314  10 662 1            CCS    DSPTAB
04,3315  0 3317 1            TC     +2
            04,3317          LOC    +1
04,3317  6 7646 1            AD     ONE          DSMAG IN A
04,3320  50 127 0            INDEX  COUNT
04,3321  7 3235 1            MASK   DSMSK
04,3322  50 127 0            INDEX  COUNT
04,3323  0 3324 1            TC     +1
04,3324  0 3326 0            TC     +2           EVEN(RIGHT)  OK
04,3325  0 4447 1            TC     RIGHT5       ODD(LEFT)  SHIFT RIGHT
04,3326  54 110 0            TS     CODE
04,3327  4 7225 1            CS     FIVE
04,3330  6 0637 0            AD     DSPCOUNT     DSPCOUNT-5
04,3331  10 000 0            CCS    A            TO PREVENT -0
04,3332  6 7646 1            AD     ONE
04,3333  0 3335 1            TC     +2
            04,3335          LOC    +1
04,3335  54 127 1            TS     COUNT
04,3336  0 3157 1            TC     DSPIN        CODE ALREADY IN CODE
04,3337  4 0637 1            CS     DSPCOUNT
04,3340  6 4444 1            AD     R1D1         OCT 16
04,3341  10 000 0            CCS    A
04,3342  56 637 0            XCH    DSPCOUNT     +, DSPCOUNT L/ OCT 16
04,3343  6 7646 1            AD     ONE          INCREMENT DSPCOUNT
04,3344  0 3304 0            TC     BUMP    +1

04,3345  3 7653 0  SWSGN     CAF    ZERO         -0, DSPCOUNT= OCT 16, DO SIGN SHIFT
04,3346  54 637 1            TS     DSPCOUNT
04,3347  6 3376 0            AD     SWTAB   +2   OCT 3
04,3350  50 000 1            INDEX  A            PICKUP ORDER , DSREL=3,4,5,6,
04,3351  10 662 1            CCS    DSPTAB                      (-R2,+R2,-R1,+R1)
04,3352  0 3354 0            TC     +2
            04,3354          LOC    +1
04,3354  6 7646 1            AD     ONE
04,3355  7 7634 0            MASK   BIT11
04,3356  54 110 0            TS     CODE
04,3357  50 637 0            INDEX  DSPCOUNT
04,3360  3 3374 1            CAF    SWTAB        PUT AWAY ORDER, DSREL= 0,1,3,4,
04,3361  0 3241 0            TC     11DSPIN                     (-R3,+R3,-R2,+R2,)
04,3362  4 0637 1            CS     DSPCOUNT
04,3363  6 3376 0            AD     SWTAB   +2   OCT 3
04,3364  10 000 0            CCS    A
04,3365  56 637 0            XCH    DSPCOUNT     +, DSPCOUNT L/ 3
04,3366  6 7646 1            AD     ONE          INCREMENT DSPCOUNT
04,3367  0 3346 0            TC     SWSGN   +1
04,3370  3 4444 1            CAF    R1D1         -0,         DSPCOUNT = 3
04,3371  54 637 1            TS     DSPCOUNT
04,3372  0 2454 0            TC     5BLANK       BLANKS R1
```

```
1853                    04,3373  0 0122 0           TC       ENTEXIT

1854                    04,3374   00000 1  SWTAB    OCT      0                  -R3
1855                    04,3375   00001 0           OCT      1                  +R3
1856                    04,3376   00003 1           OCT      3                  -R2
1857                    04,3377   00004 0           OCT      4                  +R2
```

```
NVSUB IS USED FOR SUB ROUTINE CALLS FROM WITHIN COMPUTER. IT CAN BE
USED TO DO ANY THING THE KEYBOARD CAN CALL. PLACE  ...VVVVVVVNNNNNN
INTO A.      V-S ARE 6 BIT VERB CODE. N-S , 6 BIT NOUN CODE.

NVSUB CAN BE USED WITH MACH CADR TO BE SPEC BY PLACING THE CADR INTO
MPAC+2 BEFORE THE STANDARD NVSUB CALL.

 NVSUB RETURNS TO 2+ CALLING LOC AFTER PERFORMING TASK, IF DISPLAY
SYSTEM IS AVAILABLE. THE NEW NOUN AND VERB CODES ARE DISPLAYED.
IF V:S =0, THE NEW NOUN CODE IS DISPLAYED ONLY(RETURN WITH NO FURTHER
ACTION). IF N-S =0, THE NEW VERB CODE IS DISPLAYED ONLY(RETURN WITH NO
FURTHER ACTION).

IT RETURNS TO 1+ CALLING LOC WITHOUT PERFORMING TASK, IF DISPLAY
SYSTEM IS BLOCKED (NOTHING IS DISPLAYED IN THIS CASE).
IT DOES TC ABORT (WITH OCT 01501) IF IT ENCOUNTERS A DISPLAY PROGRAM
ALARM CONDITION BEFORE RETURN TO CALLER.

THE DISPLAY SYSTEM IS BLOCKED BY THE DEPRESSION OF ANY
KEY, EXCEPT ERROR LIGHT RESET. ALSO BY ENDIDLE.
      IT IS RELEASED BY SPECIAL VERB = RELEASE DISPLAY, ALL GO TO VERBS,
PROCEED WITHOUT DATA, TERMINATE, INITIALIZE EXECUTIVE,
RECALL PART OF RECALTST IF ENDIDLE WAS USED.
IN RECALTST IF NVSUB INITIATED LOAD AND ENDIDLE WAS NOT USED,
VB = REQUEST EXECUTIVE, VB = REQUEST WAITLIST,
MONITOR SET UP.

A NVSUB CALL THAT PASSES DSPLOCK ENDS OLD MONITOR.

DSPLOCK IS THE INTERLOCK FOR USE OF KEYBOARD AND DISPLAY SYSTEM WHICH
LOCKS OUT INTERNAL USE WHENEVER THERE IS EXTERNAL KEYBOARD ACTION.

NVSUB IN FIXED-FIXED PLACES 2+CALLING LOC INTO NVQTEM, TC NVSUBEND INTO
ENTRET. (THIS WILL RESTORE OLD CALLING BANK BITS)

                            4356            SETLOC  MIDSIX  +1
                   4356  54 107 0  NVSUB      TS      NVTEMP          IN FIXED FIXED
                   4357  10 652 1             CCS     DSPLOCK
                   4360   0 0002 0            TC      Q               DSP SYST BLOCKED. RET TO 1+ CALLING LOC
                   4361   3 0002 0            CA      Q               DSP SYST AVAILABLE
                   4362   6 7646 1            AD      ONE
                   4363  54 700 1             TS      NVQTEM          2 + CALLING LOC INTO NVQTEM
                   4364   0 4400 1            TC      KILMONON        TURN ON KILL MONITOR BIT
                   4365   3 4371 0  NVSUBCOM  CAF     NVSBBBNK

                   4366  56 006 1             XCH     BBANK
                   4367  54 701 0             TS      NVBNKTEM
                   4370   0 2000 0            TC      NVSUBB          GO TO NVSUB1 THRU STANDARD LOC
                              E1              EBANK=  DSPCOUNT
                   4371    12001 0  NVSBBBNK  BBCON   NVSUB1
```

```
             4372   3 0002 0  NVSUBMON CA      Q                 MONDO COMES HERE
             4373   6 7646 1           AD      ONE
             4374  54 700 1            TS      NVQTEM            2 + CALLING LOC INTO NVQTEM
             4375   0 4365 0           TC      NVSUBCOM


             4376  52 701 0   NVSUBEND DXCH    NVQTEM            NVBNKTEM MUST = NVQTEM+1
             4377  52 006 0            DXCH    Z                 DTCB

                  05,3344              SETLOC  ENDRQWT +1

          05,3344   3 3363 1  NVSUB1   CAF     ENTSET            IN BANK
          05,3345  54 122 1            TS      ENTRET            SET RETURN TO NVSUBEND
          05,3346   3 3401 1           CAF     LOW6
          05,3347   7 0107 0           MASK    NVTEMP
          05,3350  54 140 0            TS      MPAC              TEMP STORAGE
          05,3351   3 3402 1           CAF     MID6
          05,3352   7 0107 0           MASK    NVTEMP
          05,3353   0 4447 1           TC      RIGHT5
          05,3354  54 020 1            TS      CYR
          05,3355  56 020 0            XCH     CYR
          05,3356  54 141 1            TS      MPAC     +1       TEMP STORAGE
          05,3357  10 140 0            CCS     MPAC              TEST NOUN
          05,3360   0 3364 0           TC      +4                IF NOUN NOT +0, GO ON
          05,3361  56 141 0            XCH     MPAC     +1
          05,3362   0 2314 0           TC      UPDATVB -1        IF NOUN = +0, DISPLAY VERB . THEN RETURN
          05,3363   0 4376 1  ENTSET   TC      NVSUBEND
          05,3364  10 141 1            CCS     MPAC     +1       TEST VERB
          05,3365   0 3371 1           TC      +4                IF VERB NOT +0, GO ON
          05,3366  56 140 1            XCH     MPAC
          05,3367   0 2274 1           TC      UPDATNN -1        IF VERB = +0, DISPLAY NOUN, THEN RETURN
          05,3370   0 4376 1           TC      NVSUBEND
          05,3371  56 141 0            XCH     MPAC     +1
          05,3372   0 2314 0           TC      UPDATVB -1        IF BOTH NOUN AND VERB NOT +0, DISPLAY
          05,3373  56 140 1            XCH     MPAC              BOTH AND GO TO ENTPASO
          05,3374   0 2274 1           TC      UPDATNN -1
          05,3375   3 7653 0           CAF     ZERO
          05,3376  54 654 1            TS      LOADSTAT          SET FOR WAITING FOR DATA CONDITION
          05,3377  54 655 0            TS      CLPASS
          05,3400   0 2031 1           TC      ENTPASO

      IF INTERNAL MACH CADR TO BE SPECIFIED, MPAC+2 WILL BE PLACED INTO
      NOUNCADR IN ENTPASO (INTMCTBS ).


          05,3401    00077 1  LOW6     OCT     77
          05,3402    07700 1  MID6     OCT     7700
```

```
 1936                          4400              SETLOC NVSUBEND +2
 1937                   4400  4 7630 1  KILMONON CS     BIT15               FORCE BIT 15 OF MONSAVE1 TO 1.
 1938                   4401  0 0004 0           INHINT                           THIS IS THE KILL MONITOR BIT.
 1939                   4402  7 0661 1           MASK   MONSAVE1
 1940                   4403  6 7630 0           AD     BIT15
 1941                   4404  54 661 1           TS     MONSAVE1
 1942                   4405  0 0003 1           RELINT
 1943                   4406  0 0002 0           TC     Q


R1944   LOADSTAT  +0 INACTIVE(WAITING FOR DATA). SET BY NVSUB
R1945             +1  PROCEED NO DATA. SET BY SPECIAL VERB
R1946            -1 TERMINATE   SET BY SPECIAL VERB
R1947            -0 DATA IN   SET BY END OF LOAD ROUTINE


R1948   L  TC ENDIDLE  (FIXED FIXED)
R1949   ROUTINES THAT REQUEST LOADS THROUGH NVSUB SHOULD USE ENDIDLE WHILE
R1950   WAITING FOR THE DATA TO BE LOADED. ENDIDLE PUTS CURRENT JOB TO SLEEP.
R1951   ENDIDLE CANNOT BE CALLED FROM ERASABLE MEMORY, SINCE JOBSLEEP AND
R1952   JOBWAKE CAN HANDLE ONLY FIXED MEMORY.
R1953   RECALTST TESTS LOADSTAT AND WAKES JOB UP TO,
R1954   L+1       FOR TERMINATE
R1955   L+2       FOR PROCEED WITHOUT DATA
R1956   L+3       FOR DATA IN
R1957   IT DOES NOTHING      IF LOADSTAT INDICATES WAITING FOR DATA.

 1958                   4407  3 7646 1  ENDIDLE  CAF    ONE
 1959                   4410  54 652 1           TS     DSPLOCK
 1960                   4411  22 004 0           LXCH   FBANK
 1961                   4412  56 002 0           XCH    Q
 1962                   4413  52 120 0           DXCH   BUF2
 1963                   4414  0 4112 1           TC     MAKECADR
 1964                   4415  54 676 1           TS     CADRSTOR
 1965                   4416  0 4164 0           TC     JOBSLEEP


 1966                   4417  0 4205 1  ENDINST  TC     ENDOFJOB

R1967   DATAWAIT IS AN ALTERNATIVE TO ENDIDLE. IT RETURNS IMMEDIATELY IF
R1968   LOADSTAT INDICATES THAT DATA IS ALREADY IN, OR PROCEED OR TERMINATE HAS
R1969   BEEN EXECUTED. RETURN FORMAT IS SAME AS FOR ENDIDLE.
R1970   DATAWAIT CANNOT BE CALLED FROM ERASABLE MEMORY, SINCE JOBSLEEP
R1971   AND JOBWAKE CAN HANDLE ONLY FIXED MEMORY.
R1972   DATAWAIT SHOULD BE USED ONLY AFTER REQUESTING A LOAD VERB.

 1973                   4420  10 654 1  DATAWAIT CCS    LOADSTAT
 1974                     4421  1 4426 1            TCF     DATWAIT1       PROCEED. RETURN TO L+2.
 1975                     4422  1 4407 1            TCF     ENDIDLE        STILL WAITING. GO TO SLEEP.
 1976                     4423  0 0002 0            TC      Q              TERMINATE. RETURN TO L+1.
 1977                     4424  50 002 0            INDEX   Q              DATA IN. RETURN TO L+3.
 1978                     4425  0 0002 0            TC      2
 1979                     4426  50 002 0  DATWAIT1  INDEX   Q              RETURN TO L+2.
 1980                     4427  0 0001 0            TC      1

R1981    DATAWAIT DOES NOT RELEASE DISPLAY SYST. IT IS RELEASED AT END OF NVSUB
R1982    INITIATED LOAD, IF ENDIDLE WAS NOT USED.


 1983                        05,3403                SETLOC  MID6   +1
R1984    DSPMM  PLACE MAJOR MODE CODE INTO MODREG

 1985                  05,3403  3 4510 1  DSPMM1    CAF     MD1            GETS HERE THRU DSPMM (STANDARD LEAD IN)
 1986                  05,3404  56 637 0            XCH     DSPCOUNT
 19861                 05,3405  54 124 1            TS      DSPMMTEM       SAVE DSPCOUNT
 1987                  05,3406  3 0651 0            CA      MODREG
 1988                  05,3407  22 002 0            LXCH    Q
 1989                  05,3410  0 3255 0            TC      DSP2BIT
 19891                 05,3411  56 124 0            XCH     DSPMMTEM       RESTORE DSPCOUNT
 19892                 05,3412  54 637 1            TS      DSPCOUNT
 1990                  05,3413  0 0001 0  DSPMMEND  TC      L


R1991    RECALTST IS ENTERED DIRECTLY AFTER DATA IS
R1992    LOADED, TERMINATE VERB IS EXECUTED, OR THE PROCEED WITHOUT DATA VERB IS
R1993    EXECUTED. IT WAKES UP JOB THAT DID TC ENDIDLE.

R1994    IF NVSUB INITIATED LOAD, AND ENDIDLE WAS NOT USED, THEN IT RELEASES
R1995    DISPLAY SYST. (NEEDED FOR DATAWAIT)

 1996                        04,3400                SETLOC  SWTAB  +4

 1997                  04,3400  10 676 1  RECALTST  CCS     CADRSTOR
 1998                  04,3401  0 3406 0            TC      RECAL1
 1999                  04,3402  0 4205 1            TC      ENDOFJOB       NORMAL EXIT IF KEYBOARD INITIATED
 2000                  04,3403  0 3406 0            TC      RECAL1
 2001                  04,3404  54 676 1            TS      CADRSTOR       -0. CONCLUSION OF NVSUB INITIATED LOAD.
 2002                  04,3405  0 3424 0            TC      RECAL3         +0 INTO CADRSTOR. RELEASE DISPLAY,
A2003                                                                         AND ENDOFJOB. NEEDED FOR DATAWAIT.
 2004                  04,3406  3 7653 0  RECAL1    CAF     ZERO
 2005                  04,3407  56 676 0            XCH     CADRSTOR
 2006                  04,3410  0 0004 0            INHINT
 2007                  04,3411  0 4170 0            TC      JOBWAKE
 2008                  04,3412  10 654 1            CCS     LOADSTAT
 2009                  04,3413  0 3430 0            TC      DOPROC         + PROCEED WITHOUT DATA
```

```
2010                    04,3414  0 4205 1            TC      ENDOFJOB       PATHALOGICAL CASE EXIT
2011                    04,3415  0 3426 1            TC      DOTERM         -   TERMINATE
2012                    04,3416  3 7645 1            CAF     TWO
2013                    04,3417  50 635 1  RECAL2    INDEX   LOCCTR
2014                    04,3420  6 0150 0            AD      LOC            LOC IS + FOR BASIC JOBS
2015                    04,3421  50 635 1            INDEX   LOCCTR
2016                    04,3422  54 150 1            TS      LOC
2017                    04,3423  0 0003 1            RELINT
2018                    04,3424  0 4633 0  RECAL3    TC      RELDSP1        DOES NOT SEARCH LIST
2019                    04,3425  0 4205 1            TC      ENDOFJOB

2020                    04,3426  3 7653 0  DOTERM    CAF     ZERO
2021                    04,3427  0 3417 0            TC      RECAL2

2022                    04,3430  3 7646 1  DOPROC    CAF     ONE
2023                    04,3431  0 3417 0            TC      RECAL2
```

```
P2024   THE FOLLOWING REFERS TO THE NOUN TABLES


R2025   COMPONENT CODE NUMBER             INTERPRETATION

R2026   00000                             1 COMPONENT
R2027   00001                             2 COMPONENT (EACH S P)
R2028   00010                             3 COMPONENT (EACH SP)


R2029   SF ROUTINE CODE NUMBER            INTERPRETATION

R2030   00000     OCTAL ONLY
R2031   00001     STRAIGHT FRACTIONAL
R2032   00010     DEGREES (XXX.XX)
R2033   00011     ARITHMETIC SF
R2034   00100     ARITH DP1    OUT(MULT BY 2/14 AT END)       IN(STRAIGHT)
R2035   00101     ARITH DP2    OUT(STRAIGHT)                  IN(SL 7 AT END)
R2036   00110     OPTICS DEGREES(XX.XXX MAX 89.999) OR (XXX.XX MAX 179.99)
R20361  00111     ARITH DP3    OUT ( SL 7 AT END)        IN ( STRAIGHT)
R20362  END OF SF ROUTINE CODE NUMBERS


R2037   SF CONSTANT CODE NUMBER           INTERPRETATION

R2038   00000                             WHOLE
R2039   00000                             TIME SEC(XXX.XX)SAME AS WHOLE(ARITH DP1)
R2040   00001                             TIME HOURS(XXX.XX) USE ARITH DP2
R2041   00010                             DEGREES
R20411  00010                             OPTICS DEGREES
R2042   00011                             GYRO DEGREES(XX.XXX) USE ARITH DP1
R2043   00100                             GYRO BIAS DRIFT .BBXXXXX MILLIRAD/SEC
R2044   00101                             GYRO AXIS ACCEL. DRIFT
R2045                                     .BBXXXXX (MILLIRAD/SEC) / (CM/SEC SEC)
R2046   00110                             PIPA BIAS X.XXXX CM/SEC SEC
R2047   00111                             PIPA SCALE FACTOR ERROR
R2048                                          XXXXX. PARTS/MILLION
R2049   01000                             POSITION(XXXX.X KILOMETERS) USE ARITHDP3
R2050   01001                             VELOCITY(XXXX.X METERS/SEC) USE ARITHDP2
R2051   01010                             TIME HOURS(XXX.XX)WEEKS INSIDE(ARITHDP2)
R20511  01011                             ELEVATION DEGREES(89.999MAX) USE ARITH
R20512  END OF SF CONSTANT CODE NUMBERS


R2052   FOR GREATER THAN SINGLE PRECISION SCALES, PUT ADDRESS OF MAJOR PART INTO
R2053   NOUN TABLES.
```

```
R2054   OCTAL LOADS PLACE +0 INTO MAJOR PART, DATA INTO MINOR PART.
R2055   OCTAL DISPLAYS SHOW MINOR PART ONLY.
R2056   TO GET AT BOTH MAJOR AND MINOR PARTS (IN OCTAL), USE NOUN 01.
```

```
R2057   THE FOLLOWING ROUTINES ARE FOR READING THE NOUN TABLES AND THE SF TABLES
R2058   (WHICH ARE IN A SEPARATE BANK FROM THE REST OF PINBALL). THESE READING
R2059   ROUTINES ARE IN THE SAME BANK AS THE TABLES. THEY ARE CALLED BY DXCH Z.



R2060   LODNNTAB LOADS NNADTEM WITH THE NNADTAB ENTRY, NNTYPTEM WITH THE
R2061   NNTYPTAB ENTRY. IF THE NOUN IS MIXED, IDAD1TEM IS LOADED WITH THE FIRST
R2062   IDADDTAB ENTRY, IDAD2TEM THE SECOND IDADDTAB ENTRY, IDAD3TEM THE THIRD
R2063   IDADDTAB ENTRY, RUTMXTEM WITH THE RUTMXTAB ENTRY. MIXBR IS SET FOR
R2064   MIXED OR NORMAL NOUN.

 2065                             06,2000               SETLOC 24000

 2066                     06,2000  52 136 1  LODNNTAB DXCH     IDAD2TEM           SAVE RETURN INFO IN IDAD2TEM, IDAD3TEM.
 2067                     06,2001  50 642 1           INDEX    NOUNREG
 2068                     06,2002  3 2052 1           CAF      NNADTAB
 2069                     06,2003  54 132 0           TS       NNADTEM
 2070                     06,2004  50 642 1           INDEX    NOUNREG
 2071                     06,2005  3 2152 0           CAF      NNTYPTAB
 2072                     06,2006  54 133 1           TS       NNTYPTEM
 2073                     06,2007  4 0642 0           CS       NOUNREG
 2074                     06,2010  6 2036 0           AD       MIXCON
 2075                     06,2011  0 0006 1           EXTEND
 2076                     06,2012  6 2016 1           BZMF     LODMIXNN           NOUN NUMBER G/E FIRST MIXED NOUN
 2077                     06,2013  3 7646 1           CAF      ONE                NOUN NUMBER L/ FIRST MIXED NOUN
 2078                     06,2014  54 124 1           TS       MIXBR              NORMAL.  +1 INTO MIXBR.
 2079                     06,2015  0 2034 1           TC       LODNLV
 2080                     06,2016  3 7645 1  LODMIXNN CAF      TWO                MIXED.  +2 INTO MIXBR.
 2081                     06,2017  54 124 1           TS       MIXBR
 2082                     06,2020  50 642 1           INDEX    NOUNREG
 2083                     06,2021  3 2345 1           CAF      RUTMXTAB -55
 2084                     06,2022  54 137 0           TS       RUTMXTEM
 2085                     06,2023  3 6425 1           CAF      LOW10
 2086                     06,2024  7 0132 0           MASK     NNADTEM
 2087                     06,2025  54 002 1           TS       Q                  TEMP
 2088                     06,2026  50 000 1           INDEX    A
 2089                     06,2027  3 2332 1           CAF      IDADDTAB
 2090                     06,2030  54 134 0           TS       IDAD1TEM           LOAD IDAD1TEM WITH FIRST IDADDTAB ENTRY
 2091                     06,2031  0 0006 1           EXTEND
 2092                     06,2032  5 0002 0           INDEX    Q                  LOAD IDAD2TEM WITH 2ND IDADDTAB ENTRY
 2093                     06,2033  3 2334 1           DCA      IDADDTAB +1        LOAD IDAD3TEM WITH 3RD IDADDTAB ENTRY.
 2094                     06,2034  52 136 1  LODNLV   DXCH     IDAD2TEM           PUT RETURN INFO INTO A, L.
 2095                     06,2035  52 006 0           DXCH     Z

 2096                     06,2036   00055 1  MIXCON   OCT      55                 FIRST MIXED NOUN = 55.


R2097   GTSFOUT LOADS SFTEMP1, SFTEMP2 WITH THE DP SFOUTAB ENTRIES.
```

```
 2098                     06,2037   52 110 0  GTSFOUT   DXCH    SFTEMP1               2X(SFCONUM) ARRIVES IN SFTEMP1.
 2099                     06,2040   0 0006 1            EXTEND
 2100                     06,2041   5 0000 1            INDEX   A
 2101                     06,2042   3 2303 0            DCA     SFOUTAB
 2102                     06,2043   52 110 0  SFCOM     DXCH    SFTEMP1
 2103                     06,2044   52 006 0            DXCH    Z


R2104    GTSFIN LOADS SFTEMP1, SFTEMP2 WITH THE DP SFINTAB ENTRIES.

 2105                     06,2045   52 110 0  GTSFIN    DXCH    SFTEMP1               2X(SFCONUM) ARRIVES IN SFTEMP1.
 2106                     06,2046   0 0006 1            EXTEND
 2107                     06,2047   5 0000 1            INDEX   A
 2108                     06,2050   3 2253 1            DCA     SFINTAB
 2109                     06,2051   1 2043 0            TCF     SFCOM


A2110                                                                                 NN  NORMAL NOUNS
 2111                     06,2052    00000 1  NNADTAB   OCT     00000                 00 NOT IN USE
 2112                     06,2053    40000 0            OCT     40000                 01 SPECIFY MACHINE ADDRESS (FRACTIONAL)
 2113                     06,2054    40000 0            OCT     40000                 02 SPECIFY MACHINE ADDRESS (WHOLE)
 2114                     06,2055    40000 0            OCT     40000                 03 SPECIFY MACHINE ADDRESS (DEGREES)
 2115                     06,2056    40000 0            OCT     40000                 04 SPECIFY MACHINE ADDRESS (HOURS)
 2116                     06,2057    40000 0            OCT     40000                 05 SPECIFY MACHINE ADDRESS (SECONDS)
 2117                     06,2060    40000 0            OCT     40000                 06 SPECIFY MACHINE ADDRESS (GYRO DEG)
 2118                     06,2061    40000 0            OCT     40000                 07 SPECIFY MACHINE ADDRESS (Y OPT DEG.)
 2119                     06,2062    77776 1            OCT     77776                 10 CHANNEL TO BE SPECIFIED
 2120                     06,2063    00000 1            OCT     00000                 11 SPARE
 2121                     06,2064    00000 1            OCT     00000                 12 SPARE
 2122                     06,2065    00000 1            OCT     00000                 13 SPARE
 2123                     06,2066    00000 1            OCT     00000                 14 SPARE
 2124                     06,2067    77777 0            OCT     77777                 15 INCREMENT MACHINE ADDRESS
 2125                     06,2070    00024 1            ECADR   TIME2                 16 TIME SECONDS
 2126                     06,2071    00024 1            ECADR   TIME2                 17 TIME HOURS
 2127                     06,2072    00032 0            ECADR   CDUX                  20 ICDU
 2128                     06,2073    00037 0            ECADR   PIPAX                 21 PIPAS
 2129                     06,2074    00716 1            ECADR   THETAD                22 NEW ANGLES I
 2130                     06,2075    00711 0            ECADR   DSPTEM2               23 DELTA ANGLES I
 2131                     06,2076    00706 0            ECADR   DSPTEM1               24 DELTA TIME (SEC)
 2132                     06,2077    00706 0            ECADR   DSPTEM1               25 CHECKLIST
 2133                     06,2100    00706 0            ECADR   DSPTEM1               26 PRIO/DELAY, ADRES, BBCON
 2134                     06,2101    01047 0            ECADR   SMODE                 27 SELF TEST ON/OFF SWITCH
 2135                     06,2102    00706 0            ECADR   DSPTEM1               30 STAR NUMBERS
 2136                     06,2103    00721 0            ECADR   FAILREG               31 FAILREG
 2137                     06,2104    00722 0            ECADR   TDEC                  32 DECISION TIME (MIDCOURSE)
 2138                     06,2105    00724 0            ECADR   TET                   33 EPHEMERIS TIME (MIDCOURSE)
 2139                     06,2106    00726 1            ECADR   MEASQ                 34 MEASURED QUANTITY (MIDCOURSE)
 2140                     06,2107    00730 0            ECADR   ROLL                  35 ROLL, PITCH, YAW
 2141                      06,2110  00733 0           ECADR   LANDMARK         36 LANDMARK DATA 1
 2142                      06,2111  00736 0           ECADR   LANDMARK +3      37 LANDMARK DATA 2
 2143                      06,2112  00000 1           OCT     00000            40 SPARE
 2144                      06,2113  00000 1           OCT     00000            41 SPARE
 2145                      06,2114  00000 1           OCT     00000            42 SPARE
 2146                      06,2115  00000 1           OCT     00000            43 SPARE
 2147                      06,2116  00000 1           OCT     00000            44 SPARE
 2148                      06,2117  00000 1           OCT     00000            45 SPARE
 2149                      06,2120  00000 1           OCT     00000            46 SPARE
 2150                      06,2121  00000 1           OCT     00000            47 SPARE
 2151                      06,2122  00000 1           OCT     00000            50 SPARE
 2152                      06,2123  00000 1           OCT     00000            51 SPARE
 2153                      06,2124  00741 0           ECADR   GBIASX           52 GYRO BIAS DRIFT
 2154                      06,2125  00744 0           ECADR   ADIAX            53 GYRO INPUT AXIS ACCELERATION DRIFT
 2155                      06,2126  00747 0           ECADR   ADSRAX           54 GYRO SPIN AXIS ACCELERATION DRIFT

A2156                                                                          NN  MIXED NOUNS
 2157                      06,2127  02000 0           OCT     02000            55 OCDU
 2158                      06,2130  04002 1           OCT     04002            56 UNCALLED MARK DATA (OCDU & TIME(SEC))
 2159                      06,2131  02005 0           OCT     02005            57 NEW ANGLES OCDU
 2160                      06,2132  04007 1           OCT     04007            60 IMU MODE STATUS
 2161                      06,2133  02012 0           OCT     02012            61 TARGET AZIMUTH AND ELEVATION
 2162                      06,2134  02014 0           OCT     02014            62 ICDUZ AND TIME(SEC)
 2163                      06,2135  02016 1           OCT     02016            63 OCDUX AND TIME(SEC)
 2164                      06,2136  02020 1           OCT     02020            64 OCDUY AND TIME(SEC)
 2165                      06,2137  02022 0           OCT     02022            65 SAMPLED TIME (HOURS AND SECONDS)
A2166                                                                             (FETCHED IN INTERRUPT)
 2167                      06,2140  04024 0           OCT     04024            66 SYSTEM TEST RESULTS
 2168                      06,2141  04027 0           OCT     04027            67 DELTA GYRO ANGLES
 2169                      06,2142  04032 1           OCT     04032            70 PIPA BIAS
 2170                      06,2143  04035 0           OCT     04035            71 PIPA SCALE FACTOR ERROR
 2171                      06,2144  04040 1           OCT     04040            72 DELTA POSITION
 2172                      06,2145  04043 1           OCT     04043            73 DELTA VELOCITY
 2173                      06,2146  04046 1           OCT     04046            74 MEASUREMENT DATA (MIDCOURSE)
 2174                      06,2147  04051 1           OCT     04051            75 MEASUREMENT DEVIATIONS (MIDCOURSE)
 2175                      06,2150  04054 1           OCT     04054            76 POSITION VECTOR
 2176                      06,2151  04057 1           OCT     04057            77 VELOCITY VECTOR


A2177                                                                          NN        NORMAL NOUNS
 2178                      06,2152  00000 1  NNTYPTAB OCT     00000            00 NOT IN USE
 2179                      06,2153  00040 0           OCT     00040            01 1COMP  FRACTIONAL
 2180                      06,2154  00140 1           OCT     00140            02 1COMP  WHOLE
 2181                      06,2155  00102 1           OCT     00102            03 1COMP  DEGREES
 2182                      06,2156  00241 0           OCT     00241            04 1COMP  HOURS
 2183                      06,2157  00200 0           OCT     00200            05 1COMP  SECONDS
 2184                      06,2160  00203 0           OCT     00203            06 1COMP  GYRO DEGREES
 2185                      06,2161  00302 0           OCT     00302            07 1COMP  Y OPT DEGREES
 2186                      06,2162  00000 1           OCT     00000            10 1COMP  OCTAL ONLY
 2187             06,2163   00000 1         OCT     00000          11         SPARE
 2188             06,2164   00000 1         OCT     00000          12         SPARE
 2189             06,2165   00000 1         OCT     00000          13         SPARE
 2190             06,2166   00000 1         OCT     00000          14         SPARE
 2191             06,2167   00000 1         OCT     00000          15 1COMP   OCTAL ONLY
 2192             06,2170   00200 0         OCT     00200          16 1COMP   SECONDS
 2193             06,2171   00241 0         OCT     00241          17 1COMP   HOURS
 2194             06,2172   04102 0         OCT     04102          20 3COMP   DEGREES
 2195             06,2173   04140 0         OCT     04140          21 3COMP   WHOLE
 2196             06,2174   04102 0         OCT     04102          22 3COMP   DEGREES
 2197             06,2175   04102 0         OCT     04102          23 3COMP   DEGREES
 2198             06,2176   00200 0         OCT     00200          24 1COMP   SECONDS
 2199             06,2177   00140 1         OCT     00140          25 1COMP   WHOLE
 2200             06,2200   04000 0         OCT     04000          26 3COMP   OCTAL ONLY
 2201             06,2201   00140 1         OCT     00140          27 1COMP   WHOLE
 2202             06,2202   04140 0         OCT     04140          30 3COMP   WHOLE
 2203             06,2203   02000 0         OCT     02000          31 2COMP   OCTAL ONLY
 2204             06,2204   00252 1         OCT     00252          32 1COMP   TIME WEEKS
 2205             06,2205   00252 1         OCT     00252          33 1COMP   TIME WEEKS
 2206             06,2206   00350 1         OCT     00350          34 1COMP   POSITION
 2207             06,2207   04102 0         OCT     04102          35 3COMP   DEGREES
 2208             06,2210   04000 0         OCT     04000          36 3COMP   OCTAL ONLY
 2209             06,2211   04000 0         OCT     04000          37 3COMP   OCTAL ONLY
 2210             06,2212   00000 1         OCT     00000          40         SPARE
 2211             06,2213   00000 1         OCT     00000          41         SPARE
 2212             06,2214   00000 1         OCT     00000          42         SPARE
 2213             06,2215   00000 1         OCT     00000          43         SPARE
 2214             06,2216   00000 1         OCT     00000          44         SPARE
 2215             06,2217   00000 1         OCT     00000          45         SPARE
 2216             06,2220   00000 1         OCT     00000          46         SPARE
 2217             06,2221   00000 1         OCT     00000          47         SPARE
 2218             06,2222   00000 1         OCT     00000          50         SPARE
 2219             06,2223   00000 1         OCT     00000          51         SPARE
 2220             06,2224   04144 1         OCT     04144          52 3COMP   GYRO BIAS DRIFT
 2221             06,2225   04145 0         OCT     04145          53 3COMP   GYRO AXIS ACCEL, DRIFT
 2222             06,2226   04145 0         OCT     04145          54 3COMP   GYRO AXIS ACCEL, DRIFT

A2223                                                              NN         MIXED NOUNS
 2224             06,2227   00102 1         OCT     00102          55 2COMP   DEGREES, Y OPT DEGREES
 2225             06,2230   00102 1         OCT     00102          56 3COMP   DEGREES, Y OPT DEGREES, SECS
 2226             06,2231   00102 1         OCT     00102          57 2COMP   DEGREES, Y OPT DEGREES
 2227             06,2232   00000 1         OCT     00000          60 3COMP   OCTAL ONLY
 2228             06,2233   00542 1         OCT     00542          61 2COMP   DEGREES, ELEVATION DEGREES
 2229             06,2234   00002 0         OCT     00002          62 2COMP   DEGREES, SECS
 2230             06,2235   00002 0         OCT     00002          63 2COMP   DEGREES, SECS
 2231             06,2236   00002 0         OCT     00002          64 2COMP   Y OPT DEGREES, SECS
 2232             06,2237   00001 0         OCT     00001          65 2COMP   HOURS, SECONDS
 2233             06,2240   00000 1         OCT     00000          66 3COMP   WHOLE, FRACTIONAL, WHOLE
 2234             06,2241   06143 1         OCT     06143          67 3COMP   GYRO DEGREES FOR EACH
 2235             06,2242   14306 1         OCT     14306          70 3COMP   PIPA BIAS FOR EACH
 2236          06,2243   16347 0           OCT    16347      71 3COMP   PIPA SCALE FACTOR ERR.FOR EACH
 2237          06,2244   20410 0           OCT    20410      72 3COMP   POSITION FOR EACH
 2238          06,2245   22451 1           OCT    22451      73 3COMP   VELOCITY FOR EACH
 2239          06,2246   00412 0           OCT    00412      74 3COMP   TIME WEEKS, POSITION, WHOLE
 2240          06,2247   20450 1           OCT    20450      75 3COMP   POSITION, VELOCITY, POSITION
 2241          06,2250   20410 0           OCT    20410      76 3COMP   POSITION FOR EACH
 2242          06,2251   22451 1           OCT    22451      77 3COMP   VELOCITY FOR EACH


 2243          06,2252   00006 1  SFINTAB  OCT    00006      WHOLE,TIME(SEC)
 2244          06,2253   03240 1           OCT    03240
 2245          06,2254   00253 0           OCT    00253      TIME HOURS ( = 1.3..... )
 2246          06,2255   25124 1           OCT    25124        (POINT BETWEEN BITS 7-8 )
 2247          06,2256   00000 1           OCT    0          DEGREES (SFCON IN DEGINSF )
 2248          06,2257   00000 1           OCT    0
 2249          06,2260   00021 1           OCT    00021      GYRO DEGREES
 2250          06,2261   30707 1           OCT    30707
 2251          06,2262   00001 0           OCT    00001      GYRO BIAS DRIFT
 2252          06,2263   02133 1           OCT    02133
 2253          06,2264   00011 1           OCT    00011      GYRO AXIS ACCEL. DRIFT
 2254          06,2265   30322 1           OCT    30322
 2255          06,2266   00004 0           OCT    00004      PIPA BIAS
 2256          06,2267   14021 1           OCT    14021
 2257          06,2270   00314 1           OCT    00314      PIPA SCALE ERROR.
 2258          06,2271   31463 1           OCT    31463
 2259          06,2272   23420 0           OCT    23420      POSITION
 2260          06,2273   00000 1           OCT    00000
 2261          06,2274   00201 1           OCT    00201      VELOCITY
 2262          06,2275   30327 1           OCT    30327      ( POINT BETWEEN BITS 7-8 )
 2263          06,2276   01371 0           OCT    01371      TIME WEEKS
 2264          06,2277   34750 1           OCT    34750      ( POINT BETWEEN BITS 7-8 )
 22641         06,2300   00001 0           OCT    00001      ELEVATION DEGREES
 22642         06,2301   03434 1           OCT    03434
A2265                                                        END OF SFINTAB


 2266          06,2302   05174 0  SFOUTAB  OCT    05174      WHOLE, TIME(SEC)
 2267          06,2303   13261 0           OCT    13261
 2268          06,2304   27670 0           OCT    27670      TIME HOURS
 2269          06,2305   31357 1           OCT    31357
 2270          06,2306   00000 1           OCT    0          DEGREES
 2271          06,2307   00000 1           OCT    0
 2272          06,2310   01631 1           OCT    01631      GYRO DEGREES
 2273          06,2311   23146 0           OCT    23146
 2274          06,2312   35753 0           OCT    35753      GYRO BIAS DRIFT
 2275          06,2313   32323 1           OCT    32323
 2276          06,2314   03216 1           OCT    03216      GYRO AXIS ACCEL. DRIFT
 2277          06,2315   06400 0           OCT    06400
 2278             06,2316   07237 0            OCT    07237           PIPA BIAS
 2279             06,2317   37776 0            OCT    37776
 2280             06,2320   00120 1            OCT    00120           PIPA SCALE ERROR
 2281             06,2321   00000 1            OCT    00000
 2282             06,2322   00321 1            OCT    00321           POSITION
 2283             06,2323   26706 1            OCT    26706           ( POINT BETWEEN BITS 7-8 )
 2284             06,2324   37441 1            OCT    37441           VELOCITY
 2285             06,2325   14247 0            OCT    14247
 2286             06,2326   05300 1            OCT    05300           TIME WEEKS
 2287             06,2327   20305 0            OCT    20305
 22871            06,2330   34631 1            OCT    34631           ELEVATION DEGREES
 22872            06,2331   23146 0            OCT    23146
A2288                                                                 END OF SFOUTAB


A2289                                                                 MIXNOUN   SF ROUT
 2290             06,2332   00036 1  IDADDTAB  ECADR  OPTX            01        DEGREES
 2291             06,2333   00035 1            ECADR  OPTY            01        Y OPT DEGREES
 2292             06,2334   00706 0            ECADR  DSPTEM1         02        DEGREES
 2293             06,2335   00707 1            ECADR  DSPTEM1 +1      02        Y OPT DEGREES
 2294             06,2336   00710 1            ECADR  DSPTEM1 +2      02        SEC
 2295             06,2337   00752 1            ECADR  DESOPTX         03        DEGREES
 2296             06,2340   00753 0            ECADR  DESOPTX +1      03        Y OPT DEGREES
 2297             06,2341   01017 0            ECADR  WASKSET         04        OCTAL ONLY****CHANGE TO IN3****
 2298             06,2342   01017 0            ECADR  WASKSET         04        OCTAL ONLY
 22981            06,2343   01021 0            ECADR  OLDERR          04        OCTAL ONLY
 2299             06,2344   00706 0            ECADR  DSPTEM1         05        DEGREES
 2300             06,2345   00707 1            ECADR  DSPTEM1 +1      05        ELEVATION DEGREES
 2301             06,2346   00034 0            ECADR  CDUZ            06        DEGREES
 2302             06,2347   00024 1            ECADR  TIME2           06        SEC
 2303             06,2350   00036 1            ECADR  OPTX            07        DEGREES
 2304             06,2351   00024 1            ECADR  TIME2           07        SEC
 2305             06,2352   00035 1            ECADR  OPTY            10        Y OPT DEGREES
 2306             06,2353   00024 1            ECADR  TIME2           10        SEC
 2307             06,2354   00754 1            ECADR  SAMPTIME        11        HOURS
 2308             06,2355   00754 1            ECADR  SAMPTIME        11        SECONDS
 2309             06,2356   00711 0            ECADR  DSPTEM2         12        WHOLE
 2310             06,2357   00712 0            ECADR  DSPTEM2 +1      12        FRACTIONAL
 2311             06,2360   00713 1            ECADR  DSPTEM2 +2      12        WHOLE
 2312             06,2361   00756 0            ECADR  DELVX           13        GYRO DEGREES
 2313             06,2362   00760 0            ECADR  DELVX   +2      13        GYRO DEGREES
 2314             06,2363   00762 1            ECADR  DELVX   +4      13        GYRO DEGREES
 2315             06,2364   00764 1            ECADR  PBIASX          14        PIPA BIAS
 2316             06,2365   00766 0            ECADR  PBIASY          14        PIPA BIAS
 2317             06,2366   00770 1            ECADR  PBIASZ          14        PIPA BIAS
 2318             06,2367   00765 0            ECADR  PIPASCFX        15        PIPA SCALE FACTOR ERROR
 2319             06,2370   00767 1            ECADR  PIPASCFY        15        PIPA SCALE FACTOR ERROR
 2320             06,2371   00771 0            ECADR  PIPASCFZ        15        PIPA SCALE FACTOR ERROR
 2321             06,2372   01000 0            ECADR  DELR            16        POSITION
 2322              06,2373  01002 1            ECADR  DELR      +2    16       POSITION
 2323              06,2374  01004 1            ECADR  DELR      +4    16       POSITION
 2324              06,2375  01006 0            ECADR  DELVEL          17       VELOCITY
 2325              06,2376  01010 1            ECADR  DELVEL    +2    17       VELOCITY
 2326              06,2377  01012 0            ECADR  DELVEL    +4    17       VELOCITY
 2327              06,2400  00722 0            ECADR  TDEC            20       TIME WEEKS
 2328              06,2401  00726 1            ECADR  MEASQ           20       POSITION
 2329              06,2402  01014 0            ECADR  MEASMODE        20       WHOLE
 2330              06,2403  00706 0            ECADR  DSPTEM1         21       POSITION
 2331              06,2404  00710 1            ECADR  DSPTEM1   +2    21       VELOCITY
 2332              06,2405  01015 1            ECADR  DELTAQ          21       POSITION
 2333              06,2406  00706 0            ECADR  DSPTEM1         22       POSITION
 2334              06,2407  00710 1            ECADR  DSPTEM1   +2    22       POSITION
 2335              06,2410  00712 0            ECADR  DSPTEM1   +4    22       POSITION
 2336              06,2411  00706 0            ECADR  DSPTEM1         23       VELOCITY
 2337              06,2412  00710 1            ECADR  DSPTEM1   +2    23       VELOCITY
 2338              06,2413  00712 0            ECADR  DSPTEM1   +4    23       VELOCITY
 2339              06,2414  00000 1            OCT    00000                    SPARE
 2340              06,2415  00000 1            OCT    00000                    SPARE
 2341              06,2416  00000 1            OCT    00000                    SPARE
 2342              06,2417  00000 1            OCT    00000                    SPARE
 2343              06,2420  00000 1            OCT    00000                    SPARE
 2344              06,2421  00000 1            OCT    00000                    SPARE
A2345                                                                 END OF IDADDTAB


A2346                                                                 MIXNDUN  SF ROUT
 2347              06,2422  00302 0  RUTMXTAB  OCT    00302           01  DEGREES, Y OPT DEGREES
 2348              06,2423  10302 1            OCT    10302           02  DEGREES, Y OPT DEGREES, SECONDS
 2349              06,2424  00302 0            OCT    00302           03  DEGREES, Y OPT DEGREES
 2350              06,2425  00000 1            OCT    00000           04  OCTAL ONLY
 2351              06,2426  00142 0            OCT    00142           05  DEGREES, ELEVATION DEGREES
 2352              06,2427  00202 1            OCT    00202           06  DEGREES, SECONDS
 2353              06,2430  00202 1            OCT    00202           07  DEGREES, SECONDS
 2354              06,2431  00206 0            OCT    00206           10  Y OPT DEGREES, SECONDS
 2355              06,2432  00205 0            OCT    00205           11  HOURS, SECONDS
 2356              06,2433  06043 0            OCT    06043           12  WHOLE, FRACTIONAL, WHOLE
 2357              06,2434  10204 0            OCT    10204           13  GYRO DEGREES (FOR EACH)
 2358              06,2435  06143 1            OCT    06143           14  PIPA BIAS (FOR EACH)
 2359              06,2436  06143 1            OCT    06143           15  PIPA SCALE FACTOR ERROR (FOR EACH)
 2360              06,2437  16347 0            OCT    16347           16  POSITION (FOR EACH)
 2361              06,2440  12245 1            OCT    12245           17  VELOCITY (FOR EACH)
 2362              06,2441  06345 0            OCT    06345           20  TIME WEEKS, POSITION, WHOLE
 2363              06,2442  16247 1            OCT    16247           21  POSITION, VELOCITY, POSITION
 2364              06,2443  16347 0            OCT    16347           22  POSITION (FOR EACH)
 2365              06,2444  12245 1            OCT    12245           23  VELOCITY (FOR EACH)
A2366                                                                 END OF RUTMXTAB
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P2367   MISCELLANEOUS SERVICE ROUTINES IN FIXED/FIXED


 2368                               4430          SETLOC DATWAIT1 +2

R2369   SETNCADR          E CADR ARRIVES IN A. IT IS STORED IN NOUNCADR. EBANK BITS
R2370                     ARE SET. E ADRES IS DERIVED AND PUT INTO NOUNADD.

 2371                          4430  54 657 1  SETNCADR TS      NOUNCADR          STORE ECADR
 2372                          4431  54 003 0           TS      EBANK             SET EBANK BITS
 2373                          4432  7 4504 0           MASK    LOW8
 2374                          4433  6 4505 0           AD      OCT1400
 2375                          4434  54 131 0           TS      NOUNADD           PUT E ADRES INTO NOUNADD
 2376                          4435  0 0002 0           TC      Q


R2377   SETNADD           GETS E CADR FROM NOUNCADR, SETS EBANK BITS, DERIVES
R2378                     E ADRES AND PUTS IT INTO NOUNADD.

 2379                          4436  3 0657 0  SETNADD  CA      NOUNCADR
 2380                          4437  1 4431 1           TCF     SETNCADR +1


R2381   SETEBANK          E CADR ARRIVES IN A. EBANK BITS ARE SET. E ADRES IS
R2382                     DERIVED AND LEFT IN A.

 2383                          4440  54 003 0  SETEBANK TS      EBANK             SET EBANK BITS
 2384                          4441  7 4504 0           MASK    LOW8
 2385                          4442  6 4505 0           AD      OCT1400           E ADRES LEFT IN A
 2386                          4443  0 0002 0           TC      Q


 2387                          4444   00016 0  R1D1     OCT     16
 2388                          4445   00011 1  R2D1     OCT     11
 2389                          4446   00004 0  R3D1     OCT     4

 2390                          4447  54 020 1  RIGHT5   TS      CYR
 2391                          4450  4 0020 1           CS      CYR
 2392                          4451  4 0020 1           CS      CYR
 2393                          4452  4 0020 1           CS      CYR
 2394                          4453  4 0020 1           CS      CYR
 2395                          4454  56 020 0           XCH     CYR
 2396                          4455  0 0002 0           TC      Q

 2397                          4456  54 022 0  LEFT5    TS      CYL
 2398                          4457  4 0022 0           CS      CYL
```

```
4460   4 0022 0              CS       CYL
4461   4 0022 0              CS       CYL
4462   4 0022 0              CS       CYL
4463  56 022 1               XCH      CYL
4464   0 0002 0              TC       Q

4465   6 0000 1   SLEFT5     DOUBLE
4466   6 0000 1              DOUBLE
4467   6 0000 1              DOUBLE
4470   6 0000 1              DOUBLE
4471   6 0000 1              DOUBLE
4472   0 0002 0              TC       Q


4473    00037 0   LOW5       OCT      37
4474    01740 0   MID5       OCT      1740
4475    76000 0   HI5        OCT      76000            MUST STAY HERE

4476   0 4131 0   TCNOVAC    TC       NOVAC
4477   0 4251 0   TCWAIT     TC       WAITLIST
4500   0 4321 0   TCTSKOVR   TC       TASKOVER
4501   0 4142 1   TCFINDVC   TC       FINDVAC


4502    30000 1   CHRPRIO    OCT      30000            EXEC PRIORITY OF CHARIN


4503    03777 0   LOW11      OCT      3777
4504    00377 1   LOW8       OCT      377
4505    01400 1   OCT1400    OCT      1400


4506    00023 0   VD1        OCT      23
4507    00021 1   ND1        OCT      21
4510    00025 0   MD1        OCT      25

4511    00012 1   BINCON     DEC      10

4512   3 7640 1   FALTON     CA       BIT7             TURN ON OPERATOR ERROR LIGHT
4513   0 0006 1              EXTEND
4514  05 011 1               WOR      DSALMOUT         BIT 7 OF CHANNEL 11
4515   0 0002 0              TC       Q

4516   4 7640 0   FALTOF     CS       BIT7             TURN OFF OPERATOR ERROR LIGHT
4517   0 0006 1              EXTEND
4520  03 011 1               WAND     DSALMOUT         BIT 7 OF CHANNEL 11
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```
4521  0 0002 0           TC      Q

4522  3 7642 0  RELDSPON CAF     BIT5                TURN ON KEY RELEASE LIGHT
4523  0 0006 1           EXTEND
4524  05 011 1           WOR     DSALMOUT            BIT 5 OF CHANNEL 11
4525  0 0002 0           TC      Q

4526  0 0006 1  LODSAMPT EXTEND
4527  3 0025 0           DCA     TIME2
4530  52 755 1           DXCH    SAMPTIME
4531  0 0002 0           TC      Q


4532  0 0006 1  TPSL1    EXTEND                      SHIFTS MPAC, +1, +2 LEFT 1
4533  3 0142 0           DCA     MPAC     +1         LEAVES OVFIND SET TO +/- 1 FOR OF/UF
4534  20 142 1           DAS     MPAC     +1
4535  6 0140 1           AD      MPAC
4536  26 140 0           ADS     MPAC
4537  54 007 1           TS      7                   TS A DOES NOT CHANGE A ON OF/UF.
4540  0 0002 0           TC      Q                   NO NET OF/UF
4541  54 105 1           TS      OVFIND              OVFIND SET TO +/- 1 FOR OF/UF
4542  0 0002 0           TC      Q


4543  3 7641 0  FLASHON  CAF     BIT6                TURN ON V/N FLASH
4544  0 0006 1           EXTEND                      BIT 6 OF CHANNEL 11
4545  05 011 1           WOR     DSALMOUT
4546  0 0002 0           TC      Q


4547  4 7641 1  FLASHOFF CS      BIT6                TURN OFF V/N FLASH
4550  0 0006 1           EXTEND
4551  03 011 1           WAND    DSALMOUT            BIT 6 OF CHANNEL 11
4552  0 0002 0           TC      Q
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R2458   INTERNAL ROUTINES THAT USE THE KEYBOARD AND DISPLAY SYSTEM(THRU
R2459   NVSUB) MUST  TC GRABDSP  BEFOREHAND , TO GRAB THE DISPLAY SYSTEM AND
R2460   MAKE IT BUSY TO OTHER INTERNAL USERS.

R2461           WHEN FINISHED , THERE MUST BE A TC FREEDSP , TO RELEASE THE
R2462   SYSTEM FOR OTHER INTERNAL USERS.

R2463           THE CALLING SEQUENCES ARE
R2464   L           TC       GRABDSP
R2465   L+1         RETURN HERE WHEN SYSTEM IS ALREADY GRABBED
R2466   L+2         RETURN HERE MEANS YOU HAVE IT

R2467   L           TC       NVSUB
R2468   L+1         RETURN HERE IF OPERATOR HAS INTERVENED
R2469   L+2         RETURN HERE AFTER EXECUTION



R2470           A ROUTINE CALLED GRABUSY IS PROVIDED (USE IS OPTIONAL) TO PUT YOUR
R2471   JOB TO SLEEP UNTIL  THE SYSTEM IS FREED BY THE JOB HOLDING IT.
R2472   GRABUSY CANNOT BE CALLED FROM E MEMORY, SINCE JOBSLEEP AND JOBWAKE
R2473   HANDLE ONLY FIXED MEMORY.
R2474   YOUR CADR IS PUT AT FIRST AVAILABLE SLOT IN A WAITING LIST (FIFO).

R2475           THE CALLING SEQUENCE IS
R2476               CAF      WAKEFCADR
R2477               TC       GRABUSY

R2478           A ROUTINE CALLED  NVSUBUSY IS PROVIDED (USE IS OPTIONAL)  TO PUT
R2479   YOUR JOB TO SLEEP UNTIL THE OPERATOR RELEASES IT.
R2480   NVSUBUSY CANNOT BE CALLED FROM E MEMORY, SINCE JOBSLEEP AND JOBWAKE
R2481   HANDLE ONLY FIXED MEMORY.
R2482                                                       YOUR CADR IS PUT
R2483   ON TOP OF A WAITING LIST (FIFO). IT ALSO TURNS ON KEY RELEASE LIGHT.

R2484            THE CALLING SEQUENCE IS
R2485               CAF      WAKEFCADR
R2486               TC       NVSUBUSY



R2487   AFTER A TC FREEDSP, THE INTERNAL INTERLOCK IS KEPT BUSY FOR 10 SECONDS,
R2488   AFTER WHICH A CADR IS CALLED FROM THE LIST. THIS INSURES THAT ALL
R2489   DISPLAYS WAITING WILL BE VISIBLE.



R2490   GRABLOCK IS THE INTERNAL INTERLOCK FOR THE USE OF THE KEYBOARD
R2491   AND DISPLAY SYSTEM.
R2492   +0  FREE
```

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R2493    +1  SOME INTERNAL ROUTINE HAS GRABBED DSP SYST
R2494    +2  SOME INTERNAL ROUTINE HAS GONE TO NVSUBUSY


 2495                         4553  10 677 0  GRABDSP   CCS     GRABLOCK
 2496                         4554  0 0002 0            TC      Q                    ALREADY GRABBED, RETURN TO L+1
 2497                         4555  3 7646 1            CAF     ONE                  NOT GRABBED, SET TO +1
 2498                         4556  54 677 0            TS      GRABLOCK             AND RETURN TO L+2
 2499                         4557  50 002 0            INDEX   Q
 2500                         4560  0 0001 0            TC      1


 2501                         4561  3 6425 1  PREGBSY   CAF     LOW10                SPECIAL ENTRANCE FOR ROUTINES IN FIXED
 2502                         4562  7 0002 1            MASK    Q                    BANKS ONLY DESIRING THE FCADR OF
 2503                         4563  6 0004 0            AD      FBANK                1 + (LOC FROM WHICH TC PREGBSY WAS DONE)
 2504                         4564  0 4102 0  GRABUSY   TC      POSTJUMP             TO BE ENTERED.
 2505                         4565    10000 0           CADR    GRABUSYB
 2506                                 04,3432           SETLOC  DOPROC   +2
 2507                      04,3432  54 001 1  GRABUSY1  TS      L
 2508                      04,3433  10 677 0            CCS     GRABLOCK
 2509                      04,3434  0 3437 1            TC      +3                   STILL GRABBED
 2510                      04,3435  3 0001 0            CA      L                    NOT GRABBED SO DO DIRECT CALL
 2511                      04,3436  0 4105 1            TC      BANKJUMP
 2512                      04,3437  3 7645 1            CAF     TWO
 2513                      04,3440  54 130 1            TS      LSTPTR
 2514                      04,3441  50 130 0            INDEX   LSTPTR               SEARCH LIST FOR FIRST AVAILABLE SPACE
 2515                      04,3442  10 702 0            CCS     DSPLIST              FROM BOTTOM.
 2516                      04,3443  0 3445 1            TC      +2
 2517                      04,3444  0 3450 0            TC      PUTINLST             SPACE FOUND
 2518                      04,3445  10 130 1            CCS     LSTPTR               DECREMENT POINTER
 2519                      04,3446  0 3440 1            TC      -6
 2520                      04,3447  0 3514 1            TC      LSTFULL
 2521                      04,3450  3 0001 0  PUTINLST  CA      L
 2522                      04,3451  50 130 0            INDEX   LSTPTR
 2523                      04,3452  54 702 0            TS      DSPLIST
 2524                      04,3453  0 4164 0            TC      JOBSLEEP


R25241   GRABWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
R25242   SYSTEM IS NOT GRABBED, IT GRABS IT AND RETURNS TO L+1 ( L = LOC FROM
R25243   WHICH THE TC GRABWAIT WAS DONE). IF SYSTEM IS GRABBED, IT PUTS CALLING
R25244   JOB TO SLEEP WITH L+1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN
R25245   SYSTEM IS FREED.

 2525                                    4566           SETLOC  GRABUSY  +2
 25251                        4566  10 677 0  GRABWAIT  CCS     GRABLOCK
 25252                        4567  1 4561 0            TCF     PREGBSY              GRABBED. PUT L+1 INTO LIST. GO TO SLEEP.
```

```
25253                     4570  3 7646 1             CAF     ONE                 NOT GRABBED. GRAB AND RETURN TO L+1.
25254                     4571  54 677 0             TS      GRABLOCK
25255                     4572  0 0002 0             TC      Q



2526                      4573  4 4600 1  PRENVBSY   CS      2K+3                SPECIAL ENTRANCE FOR ROUTINES IN FIXED
2527                      4574  6 0002 0             AD      Q                   BANKS ONLY DESIRING THE FCADR OF(LOC
2528                      4575  6 0004 0             AD      FBANK               FROM WHICH THE TC PRENVBSY WAS DONE) -2
2529                      4576  0 4102 0  NVSUBUSY   TC      POSTJUMP            TO BE ENTERED.
2530                      4577    10001 1            CADR    NVSUBSYB
2531                      4600    02003 0  2K+3      OCT     2003

2532                               04,3454           SETLOC  PUTINLST   +4
2533                   04,3454  54 001 1  NVSUBSY1   TS      L
2534                   04,3455  10 652 1             CCS     DSPLOCK             TEST IF REALLY LOCKED OUT
2535                   04,3456  0 3461 1             TC      +3                  STILL BUSY
2536                   04,3457  3 0001 0             CA      L                   DSPLOCK = +0 SO RETURN DIRECTLY
2537                   04,3460  0 4105 1             TC      BANKJUMP
2538                   04,3461  3 7645 1             CAF     TWO                 SET FOR GRABBED STATE AND NVSUBUSY USE
2539                   04,3462  54 677 0             TS      GRABLOCK
2540                   04,3463  3 0001 0             CA      L
2541                   04,3464  56 704 1             XCH     DSPLIST +2          ENTER CADR INTO FIRST POSITION OF LIST
2542                   04,3465  56 703 0             XCH     DSPLIST +1                (BOTTOM)
2543                   04,3466  56 702 1             XCH     DSPLIST
2544                   04,3467  10 000 0             CCS     A
2545                   04,3470  0 3514 1             TC      LSTFULL
2546                   04,3471  0 3473 1             TC      +2
2547                   04,3472  0 3514 1             TC      LSTFULL
2548                   04,3473  0 4522 0             TC      RELDSPON
2549                   04,3474  3 0001 0             CA      L
2550                   04,3475  0 4164 0  ENDNVBSY   TC      JOBSLEEP


R25501  NVSBWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
R25502  SYSTEM IS NOT BUSY, IT EXECUTES V/N AND RETURNS TO L+1 (L= LOC FROM
R25503  WHICH THE TC NVSBWAIT WAS DONE). IF SYSTEM IS BUSY, IT PUTS CALLING JOB
R25504  TO SLEEP WITH L-1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN SYSTEM
R25505  IS NOT BUSY.

2551                                  4601           SETLOC  NVSUBUSY +3
25511                     4601  54 107 0  NVSBWAIT   TS      NVTEMP
25512                     4602  10 652 1             CCS     DSPLOCK
25513                     4603  1 4606 1             TCF     NVSBWT1             BUSY
25514                     4604  3 0002 0             CA      Q                   FREE. NVSUB WILL SAVE L+1 FOR RETURN
25515                     4605  1 4363 1             TCF     NVSUB    +5         AFTER EXECUTION.
25516                     4606  24 002 0  NVSBWT1    INCR    Q                   L+2. PRENVBSY WILL PUT L-1 INTO LIST AND
25517                     4607  1 4573 0             TCF     PRENVBSY            GO TO SLEEP.
```

```
4610  56 002 0  RELDSP   XCH     Q            SET DSPLOCK TO +0. TURN RELDSP LIGHT
4611  54 130 1           TS      RELRET       OFF.  SEARCH DSPLIST
4612  3 7655 0           CAF     NEG1
4613  6 0677 1           AD      GRABLOCK
4614  0 0006 1           EXTEND               SEARCH LIST ONLY IF GRABLOCK = +2
4615  6 4623 1           BZMF    RELDSP2        (SOMEONE USED NVSUBUSY)
4616  0 4636 0           TC      WKSEARCH
4617  0 4623 1           TC      RELDSP2      LIST EMPTY
4620  0 4170 0           TC      JOBWAKE      LIST NOT EMPTY
4621  3 7646 1           CAF     ONE
4622  54 677 0           TS      GRABLOCK
4623  0 0004 0  RELDSP2  INHINT
4624  4 7642 1           CS      BIT5         TURN OFF KEY RELEASE LIGHT
4625  0 0006 1           EXTEND               (BIT 5 OF CHANNEL 11)
4626  03 011 1           WAND    DSALMOUT
4627  3 7653 0           CAF     ZERO
4630  54 652 1           TS      DSPLOCK
4631  0 0003 1           RELINT
4632  0 0130 0           TC      RELRET
4633  56 002 0  RELDSP1  XCH     Q            SET DSPLOCK TO +0, RELDSP LIGHT OFF,
4634  54 130 1           TS      RELRET       NO LIST SEARCH
4635  0 4623 1           TC      RELDSP2


4636  3 7653 0  WKSEARCH CAF     ZERO         SEARCHES LIST. LEAVES RESULT IN A.
4637  56 702 1           XCH     DSPLIST      IF EMPTY, RETURN TO L+1.
4640  56 703 0           XCH     DSPLIST +1   IF NOT EMPTY, INHINT AND RETURN TO L+2.
4641  56 704 1           XCH     DSPLIST +2
4642  0 0006 1           EXTEND
4643  1 4647 1           BZF     +4           EMPTY
4644  0 0004 0           INHINT               NOT EMPTY
4645  50 002 0           INDEX   Q            RETURN TO L+2
4646  0 0001 0           TC      1
4647  0 0002 0           TC      Q            RETURN TO L+1


4650  56 002 0  FREEDSP  XCH     Q
4651  54 130 1           TS      FREERET
4652  0 0004 0           INHINT
4653  3 4661 1           CAF     SHOTIME
4654  0 4251 0           TC      WAITLIST
             E1          EBANK=  DSPCOUNT
4655   03476 1           2CADR   FREEWAIT
4656   10001 1
4657  0 0003 1           RELINT
4660  0 0130 0           TC      FREERET

4661   01750 1  SHOTIME  OCT     1750
```

```
 2594                          04,3476            SETLOC ENDNVBSY +1

 2595                  04,3476  3 4502 1 FREEWAIT CAF    CHRPRIO             CALLED BY T3RUPT
 2596                  04,3477  0 4131 0          TC     NOVAC
 2597                                 E1          EBANK= DSPCOUNT
 2598                  04,3500   03503 1          2CADR  FREDSPDO
C2598                  04,3501   10001 1
 2599                  04,3502  0 4321 0          TC     TASKOVER


 2600                  04,3503  0 4636 0 FREDSPDO TC     WKSEARCH            CALLED BY EXECUTIVE
 2601                  04,3504  0 3512 1          TC     LSTEMPTY            LIST EMPTY
 2602                  04,3505  0 4170 0          TC     JOBWAKE             LIST NOT EMPTY
 2603                  04,3506  0 0003 1          RELINT
 2604                  04,3507  3 7646 1          CAF    ONE                 SET FOR GRABBED CONDITION
 2605                  04,3510  54 677 0          TS     GRABLOCK
 2606                  04,3511  0 4205 1          TC     ENDOFJOB
 2607                  04,3512  3 7653 0 LSTEMPTY CAF    ZERO                SET FOR FREE CONDITION
 2608                  04,3513  0 3510 0          TC     -3


 2609                  04,3514  0 4662 1 LSTFULL  TC     ABORT
 2610                  04,3515   01206 1          OCT    01206               PINBALL WAITING LINE FULL.

 2611                             4662            SETLOC SHOTIME +1
 2612                     4662  0 4662 1 ABORT    TC     ABORT               ****FIX LATER*****
```

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        PINBALL GAME  BUTTONS AND LIGHTS                                              USER'S OWN PAGE NO.  74

P2613   VBTSTLTS TURNS ON ALL DISPLAY PANEL LIGHTS. AFTER 5 SEC, IT TURNS
R2614   OFF THE CAUTION AND STATUS LIGHTS.

 2615                        05,3414               SETLOC DSPMMEND +1

 2616               05,3414  3 3453 0  VBTSTLTS CAF    TSTCON1             TURN ON UPLINK ACTIVITY, TEMP, KEY RLSE,
 2617               05,3415  0 0006 1           EXTEND                     V/N FLASH, OPERATOR ERROR.
 2618               05,3416  05 011 1           WOR    DSALMOUT
 2619               05,3417  3 3454 1           CAF    TSTCON2             TURN ON AUTO, HOLD, NO ATT, SPARE,
 2620               05,3420  54 675 1           TS     DSPTAB   +11D       GIMBAL LOCK, SPARE, TRACKER, PROG ALM.
 2621               05,3421  3 7635 0           CAF    BIT10               TURN ON TEST ALARM OUTBIT
 2622               05,3422  0 0006 1           EXTEND
 2623               05,3423  05 013 0           WOR    CHAN13
 2624               05,3424  0 0004 0           INHINT
 2625               05,3425  3 7650 0           CAF    TEN
 2626               05,3426  54 103 1  TSTLTS1  TS     ERCNT
 2627               05,3427  4 3451 0           CS     FULLDSP
 2628               05,3430  50 103 0           INDEX  ERCNT
 2629               05,3431  54 662 1           TS     DSPTAB
 2630               05,3432  10 103 1           CCS    ERCNT
 2631               05,3433  0 3426 1           TC     TSTLTS1
 2632               05,3434  4 3452 0           CS     FULLDSP1
 2633               05,3435  54 663 0           TS     DSPTAB   +1         TURN ON 3 PLUS SIGNS
 2634               05,3436  54 666 0           TS     DSPTAB   +4
 2635               05,3437  54 670 1           TS     DSPTAB   +6
 2636               05,3440  3 7647 0           CAF    ELEVEN
 2637               05,3441  54 656 0           TS     NOUT
 26371              05,3442  0 0003 1           RELINT
 2638               05,3443  3 3456 0           CAF    SHOLTS
 26381              05,3444  0 0004 0           INHINT
 2639               05,3445  0 4251 0           TC     WAITLIST
 2640                              E1           EBANK= DSPTAB
 2641               05,3446   03457 1           2CADR  TSTLTS2
C2641               05,3447   12001 0
 2642               05,3450  0 4205 1           TC     ENDOFJOB            DSPLOCK IS LEFT BUSY (FROM KEYBOARD
A26421                                                                     ACTION) UNTIL TSTLTS3 TO INSURE THAT
A26422                                                                     LIGHTS TEST WILL BE SEEN.


 2643               05,3451   05675 0  FULLDSP  OCT    05675               DISPLAY ALL 8'S
 2644               05,3452   07675 1  FULLDSP1 OCT    07675               DISPLAY ALL 8'S AND +
 2645               05,3453   00174 0  TSTCON1  OCT    00174               CHAN 11 BITS 3-7
A2646                                                                      UPLINK ACTIVITY, TEMP, KEY RLSE,
A2647                                                                      V/N FLASH, OPERATOR ERROR.
 2650               05,3454   40777 1  TSTCON2  OCT    40777               DSPTAB+11D BITS 1-9
A2651                                                                      AUTO, HOLD, FREE, NO ATT, SPARE,
A2652                                                                      GIMBAL LOCK, SPARE, TRACKER, PROG ALM.
 26525              05,3455   00114 0  TSTCON3  OCT    00114               CHAN 11  BITS 3,4,7
A26526                                                                     UPLINK ACTIVITY, TEMP, OPERATOR ERROR.
```

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 2653                   05,3456   00764 1  SHOLTS   OCT     764              5 SEC


 26531                  05,3457  3 4502 1  TSTLTS2  CAF     CHRPRIO          CALLED BY WAITLIST
 26532                  05,3460  0 4131 0           TC      NOVAC
 26533                                E1            EBANK=  DSPTAB
 26534                  05,3461   03464 1           2CADR   TSTLTS3
C26534                  05,3462   12001 0
 26535                  05,3463  0 4321 0           TC      TASKOVER


 2654                   05,3464  4 3455 1  TSTLTS3  CS      TSTCON3          CALLED BY EXECUTIVE
 2655                   05,3465  0 0006 1           EXTEND                   TURN OFF  UPLINK ACTIVITY, TEMP,
 2657                   05,3466  03 011 1           WAND    DSALMOUT         OPERATOR ERROR.
 2658                   05,3467  4 7635 1           CS      BIT10            TURN OFF TEST ALARM OUTBIT
 2659                   05,3470  0 0006 1           EXTEND
 2660                   05,3471  03 013 0           WAND    CHAN13
 2661                   05,3472  3 7630 0           CAF     BIT15            TURN OFF AUTO, HOLD, FREE, NO ATT, SPARE
 2662                   05,3473  54 675 1           TS      DSPTAB  +11D     GIMBAL LOCK, SPARE, TRACKER, PROG ALM
 2663                   05,3474  0 2001 1           TC      DSPMM            REDISPLAY C(MODREG)
 2664                   05,3475  0 4102 0           TC      POSTJUMP         TURN OFF KEY RLSE LIGHT (AND SEARCH LIST
 2665                   05,3476   11273 1           CADR    VBTERM           IF APPROPRIATE).
A2666                                                                        TURN OFF V/N FLASH, SET LOADSTAT FOR
A2667                                                                        FOR TERMINATE CONDITION, AND GO TO
A2668                                                                        RECALTST. FINALLY DO TC ENDOFJOB.
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 INS    AGC BLK2 INSTRUCTION CHECK                                                       USER'S OWN PAGE NO.    1
 0009                             4663                SETLOC ABORT +1

R0010   ADDRESSES OF ERASABLE REGISTERS
 0011                       4663    01034 1  ADRS1     ADRES  KEEP1
 0012                       4664    01035 0  ADRS2     ADRES  KEEP2
 0013                       4665    01036 0  ADRS3     ADRES  KEEP3
 0014                       4666    02411 1  ADRS4     ADRES  SELF1
 0015                       4667    02417 1  ADRS5     ADRES  SELF2
 0016                       4670    04725 0  ADRS6     ADRES  S+MAX
 0017                       4671    02473 0  ADRS7     ADRES  SELF3

R00171  CONSTANTS USED THROUGHOUT THE INSTRUCTIONS CHECK
 0018                       4672    00001 0  SBIT1     OCTAL  00001
 0019                       4673    00002 0  SBIT2     OCTAL  00002
 0020                       4674    00004 0  SBIT3     OCTAL  00004
 0021                       4675    00010 0  SBIT4     OCTAL  00010
 0022                       4676    00020 0  SBIT5     OCTAL  00020
 0023                       4677    00040 0  SBIT6     OCTAL  00040
 0024                       4700    00100 0  SBIT7     OCTAL  00100
 0025                       4701    00200 0  SBIT8     OCTAL  00200
 0026                       4702    00400 0  SBIT9     OCTAL  00400
 0027                       4703    01000 0  SBIT10    OCTAL  01000
 0028                       4704    02000 0  SBIT11    OCTAL  02000
 0029                       4705    04000 0  SBIT12    OCTAL  04000
 0030                       4706    10000 0  SBIT13    OCTAL  10000
 0031                       4707    20000 0  SBIT14    OCTAL  20000
 0032                       4710    40000 0  SBIT15    OCTAL  40000

 0033                       4711    00000 1  S+ZERO    OCTAL  00000
 0034                       4712    00001 0  S+1       OCTAL  00001
 0035                       4713    00002 0  S+2       OCTAL  00002
 0036                       4714    00003 1  S+3       OCTAL  00003
 0037                       4715    00004 0  S+4       OCTAL  00004
 0038                       4716    00005 1  S+5       OCTAL  00005
 0039                       4717    00006 1  S+6       OCTAL  00006
 0040                       4720    00007 0  S+7       OCTAL  00007
 0041                       4721    00077 1  S6BITS    OCTAL  00077
 0042                       4722    00177 0  S7BITS    OCTAL  00177
 0043                       4723    17777 0  S13BITS   OCTAL  17777                      SEVEN ONE BITS
 0044                       4724    25252 0  SODD      OCTAL  25252
 0045                       4725    37777 1  S+MAX     OCTAL  37777
 0046                       4726    40000 0  S-MAX     OCTAL  40000
 0047                       4727    40400 1  ALARMCON  OCTAL  40400
 0048                       4730    52500 0  SINOUT1   OCTAL  52500
 0049                       4731    52525 1  SEVENS    OCTAL  52525                      EIGHT ONE BITS
 0050                       4732    52552 1  SINOUT2   OCTAL  52552
 0051                       4733    57761 0  CYRCON    OCTAL  57761
 0052                       4734    77725 1  SINOUT3   OCTAL  77725
 0053                       4735    77760 0  S-15      OCTAL  77760
 0054                       4736    77761 1  S-14      OCTAL  77761
 0055                       4737    77770 1  S-7       OCTAL  77770
 0056                         4740   77771 0  S-6        OCTAL   77771
 0057                         4741   77772 0  S-5        OCTAL   77772
 0058                         4742   77773 1  S-4        OCTAL   77773
 0059                         4743   77774 0  S-3        OCTAL   77774
 0060                         4744   77775 1  S-2        OCTAL   77775
 0061                         4745   77776 1  S-1        OCTAL   77776
 0062                         4746   77777 0  S-ZERO     OCTAL   77777

R0063   NEXT TWO CONSTANTS ARE USED IN THE DEVIDE SUBROUTINE
 0064                         4747   14000 1  DV1CON     OCTAL   14000
 0065                         4750   37776 0  DV2CON     OCTAL   37776

R0066   NEXT TWO CONSTANTS ARE ADDRESSESS USED BY EXTRACODE INDEX INSTRUCTIONS
 0067                         4751   04712 1  ADRS+1     ADRES   S+1
 0068                         4752   04747 1  ADRSDV1    ADRES   DV1CON

 0069                         4753  4 0000 0             CS      A
 0070                         4754 10 000 0   -0CHK      CCS     A
 0071                         4755  1 4770 1             TCF     ERRORS
 0072                         4756  1 4770 1             TCF     ERRORS
 0073                         4757  1 4770 1             TCF     ERRORS
 0074                         4760  0 0002 0             TC      Q

 0075                         4761  4 0000 0             CS      A
 0076                         4762 10 000 0   -1CHK      CCS     A
 0077                         4763  1 4770 1             TCF     ERRORS
 0078                         4764  1 4770 1             TCF     ERRORS
 0079                         4765 10 000 0              CCS     A
 0080                         4766  1 4770 1             TCF     ERRORS
 0081                         4767  0 0002 0             TC      Q


 0082                         4770 56 002 0   ERRORS     XCH     Q
 0083                         4771 55'044 1              TS      SFAIL              SAVE Q FOR FAILURE LOCATION
 0084                         4772 25'045 1              INCR    ERCOUNT            KEEP TRACK OF NUMBER OF MALFUNCTIONS
 0085                         4773  0 0004 0             INHINT                     TURN ON PROGRAM ALARM LIGHT
 0086                         4774  4 4727 0             CS      ALARMCON
 0087                         4775  7 0675 1             MASK    DSPTAB +11D
 0088                         4776  6 4727 1             AD      ALARMCON
 0089                         4777 54 675 1              TS      DSPTAB +11D
 0090                         5000  0 0003 1             RELINT

R0091   IF C(SMODE) IS +NON-ZERO START CHECKING AGAIN AT TCCHK
R0092   IF C(SMODE) IS + PUT +0 IN SMODE AND IDLE
 0093                         5001  3 1047 0             CA      SMODE
 0094                         5002  0 0006 1             EXTEND
 0095                         5003  6 5005 1             BZMF    STOPCHK
 0096                         5004  0 5010 0             TC      SMODECHK
 0097                         5005  3 4711 1  STOPCHK    CA      S+ZERO
 0098                         5006 55'047 1              TS      SMODE
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0099                        5007  0 4224 1            TC      CHECKNJ
0100                        5010  11'047 1  SMODECHK  CCS     SMODE              +>0
0101                        5011  0 5014 1            TC      +3
0102                        5012  0 5007 0            TC      SMODECHK -1         +0
0103                        5013  0 5014 1            TC      +1                  -<0
0104                        5014  0 4224 1            TC      CHECKNJ             -0
0105                        5015  3 5017 1            CAF     STRTCHK
0106                        5016  0 4105 1            TC      BANKJUMP           TO START OF CHECKING ROUTINES
0107                        5017   16003 0  STRTCHK   CADR    TCCHK

0136                             07,2000              SETLOC  26000

01361                    07,2000  3 4711 1            CA      S+ZERO             INITIALIZE COUNT REGISTER
01362                    07,2001  55'045 0            TS      ERCOUNT
01363                    07,2002  55'046 0            TS      SCOUNT

R0137   NORMAL USE OF TC AND TCF
 0138                    07,2003  0 2005 0  TCCHK     TC      +2
 0139                    07,2004  0 2011 0            TC      CCSCHK
 0140                    07,2005  1 2007 0            TCF     +2
 0141                    07,2006  0 4770 0            TC      ERRORS
 0142                    07,2007  0 0002 0            TC      Q
 0143                    07,2010  0 4770 0            TC      ERRORS

R0144   NORMAL USE OF CA, CS, AND CCS
 01441                   07,2011  3 4743 0  CCSCHK    CA      S-3
 0145                    07,2012  55'034 0            TS      KEEP1
 0146                    07,2013  11'034 0            CCS     KEEP1
 0147                    07,2014  0 4770 0            TC      ERRORS
 0148                    07,2015  0 4770 0            TC      ERRORS
 0149                    07,2016  0 2020 1            TC      +2
 0150                    07,2017  0 4770 0            TC      ERRORS
 0151                    07,2020  10 000 0            CCS     A                  C(A) =+2, RESULT OF CCS -NUMBER
 0152                    07,2021  0 2025 1            TC      +4
 0153                    07,2022  0 4770 0            TC      ERRORS
 0154                    07,2023  0 4770 0            TC      ERRORS
 0155                    07,2024  0 4770 0            TC      ERRORS
 0156                    07,2025  10 000 0            CCS     A                  C(A) = +1, RESULT OF CCS + NUMBER
 0157                    07,2026  0 2032 1            TC      +4
 0158                    07,2027  0 4770 0            TC      ERRORS
 0159                    07,2030  0 4770 0            TC      ERRORS
 0160                    07,2031  0 4770 0            TC      ERRORS
 0161                    07,2032  10 000 0            CCS     A                  C(A) = +0, RESULT OF CCS + NUMBER
 0162                    07,2033  0 4770 0            TC      ERRORS
 0163                    07,2034  0 2037 1            TC      +3
 0164                    07,2035  0 4770 0            TC      ERRORS
 0165                    07,2036  0 4770 0            TC      ERRORS
 0166                    07,2037  4 0000 0            CS      A
 0167                    07,2040  10 000 0            CCS     A                  C(A) = -0, RESULT OF CCS +0
 0168                    07,2041  0 4770 0            TC      ERRORS
 0169                  07,2042  0 4770 0           TC     ERRORS
 0170                  07,2043  0 4770 0           TC     ERRORS
 0171                  07,2044  10 000 0           CCS    A                RESULT OF CCS -0
 0172                  07,2045  0 4770 0           TC     ERRORS
 0173                  07,2046  0 2051 1           TC     +3
 0174                  07,2047  0 4770 0           TC     ERRORS
 0175                  07,2050  0 4770 0           TC     ERRORS

R0176     NORMAL USE OF MASK
 0177                  07,2051  4 4746 1  MSKCHK   CS     S-ZERO
 0178                  07,2052  7 4746 1           MASK   S-ZERO           00000, 77777
 0179                  07,2053  0 4753 1           TC     -0CHK -1
 0180                  07,2054  4 4711 0           CS     S+ZERO
 0181                  07,2055  7 4711 0           MASK   S+ZERO           77777, 00000
 0182                  07,2056  0 4753 1           TC     -0CHK -1
 0183                  07,2057  3 4711 1           CA     S+ZERO
 0184                  07,2060  7 4711 0           MASK   S+ZERO           00000, 00000
 0185                  07,2061  0 4753 1           TC     -0CHK -1
 0186                  07,2062  3 4746 0           CA     S-ZERO
 0187                  07,2063  7 4746 1           MASK   S-ZERO           77777, 77777
 0188                  07,2064  0 4754 0           TC     -0CHK
R0189     NO EDIT FEATURE OF MASK IS CHECKED
R0190     BITS 9-14 OF WRITE LINES GO TO BITS 1-7 OF EDOP
 0191                  07,2065  3 4746 0           CA     S-ZERO           77777
 0192                  07,2066  54 023 1           TS     EDOP             00177
 0193                  07,2067  7 0023 1           MASK   EDOP             00177
 0194                  07,2070  55'034 0           TS     KEEP1            00177
 0195                  07,2071  7 0023 1           MASK   EDOP             00177
 0196                  07,2072  4 0000 0           CS     A                77600
 0197                  07,2073  6 1034 1           AD     KEEP1            77777
 0198                  07,2074  0 4754 0           TC     -0CHK
R01981    CHECK MASK OF AN SC REGISTER
 01982                 07,2075  3 4712 1           CA     S+1
 01983                 07,2076  54 001 1           TS     L
 01984                 07,2077  3 4746 0           CA     S-ZERO
 01985                 07,2100  7 0001 1           MASK   L
 01986                 07,2101  0 4761 0           TC     -1CHK -1

R0199     NORMAL USE OF XCH, AD, AND TS
 0200                  07,2102  3 4725 0           CA     S+MAX            37777
 0201                  07,2103  55'034 0           TS     KEEP1
 0202                  07,2104  6 1034 1           AD     KEEP1            01 - 37776
 0203                  07,2105  55'035 1           TS     KEEP2            37776
 0204                  07,2106  0 4770 0           TC     ERRORS
 0205                  07,2107  0 4761 0           TC     -1CHK -1
 0206                  07,2110  57'034 1           XCH    KEEP1            SKEEP1 NOW +0
 0207                  07,2111  4 0000 0           CS     A                40000
 0208                  07,2112  6 0000 1           AD     A                10 - 00001
 0209                  07,2113  55'036 1           TS     KEEP3            40001, C(A) = -1
 0210                  07,2114  0 4770 0           TC     ERRORS
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INS     AGC BLK2 INSTRUCTION CHECK                                                          USER'S OWN PAGE NO.  5

 0211                             07,2115   6 1036 0          AD      KEEP3               C(A) = 40000
 0212                             07,2116   6 1035 0          AD      KEEP2               C(A) = -1
 0213                             07,2117   6 1034 1          AD      KEEP1               C(A) = -1
 0214                             07,2120  55'037 0           TS      KEEP4               -1
 0215                             07,2121   4 1037 0          CS      KEEP4               +1
 0216                             07,2122   0 4761 0          TC      -1CHK -1

R0217   NORMAL USE OF INCR
R0218   NOT CHECKING COUNTER INTERRUPT
 0219                             07,2123   3 4725 0          CA      S+MAX               37777
 0220                             07,2124  55'034 0           TS      KEEP1
 0221                             07,2125  25'034 1           INCR    KEEP1               +0
 0222                             07,2126  25'034 1           INCR    KEEP1               +1
 0223                             07,2127  25'034 1           INCR    KEEP1               +2
 0224                             07,2130   6 4726 0          AD      S-MAX
 0225                             07,2131   0 4754 0          TC      -0CHK               CHECK C(A) HAS NOT CHANGED
 0226                             07,2132   4 1034 0          CS      KEEP1
 0227                             07,2133  55'034 0           TS      KEEP1               -2
 0228                             07,2134  25'034 1           INCR    KEEP1               -1
 0229                             07,2135   3 1034 1          CA      KEEP1
 0230                             07,2136   0 4762 0          TC      -1CHK
R02301  CHECK    INCREMENT OF AN SC REGISTER
 02302                            07,2137   3 4744 1          CA      S-2
 02303                            07,2140  54 001 1           TS      L
 02304                            07,2141  24 001 0           INCR    L
 02305                            07,2142   3 0001 0          CA      L
 02306                            07,2143   0 4762 0          TC      -1CHK

R0231   NORMAL USE OF ADS
 0232                             07,2144   3 4706 1          CA      SBIT13
 0233                             07,2145  55'034 0           TS      KEEP1               10000
 0234                             07,2146  27'034 0           ADS     KEEP1               20000
 0235                             07,2147  27'034 0           ADS     KEEP1               OV WITH +0
 0236                             07,2150  55'035 1           TS      KEEP2
 0237                             07,2151   0 4770 0          TC      ERRORS
 0238                             07,2152   4 1034 0          CS      KEEP1
 0239                             07,2153   0 4754 0          TC      -0CHK
R02391  CHECKS ADS OF AN SC REGISTER
 02392                            07,2154   3 4723 0          CA      S13BITS             17777
 02393                            07,2155  54 001 1           TS      L
 02394                            07,2156   6 4712 1          AD      S+1                 C(A) = 20000
 02395                            07,2157  26 001 1           ADS     L
 02396                            07,2160   6 4726 0          AD      S-MAX
 02397                            07,2161   0 4754 0          TC      -0CHK
 02398                            07,2162   4 0001 1          CS      L
 023981                           07,2163   6 4725 0          AD      S+MAX
 02399                            07,2164   0 4754 0          TC      -0CHK

R0240   NORMAL USE OF LXCH
 0241                             07,2165   3 4712 1          CA      S+1
 0242                      07,2166  55,034 0          TS      KEEP1          +1
 0243                      07,2167  23,034 1          LXCH    KEEP1          +1 IN L
 0244                      07,2170  4 0000 0          CS      A
 0245                      07,2171  55,035 1          TS      KEEP2          -1 IN KEEP2
 0246                      07,2172  23,035 0          LXCH    KEEP2          L = -1, KEEP2 = +1
 0247                      07,2173  4 1035 1          CS      KEEP2
 0248                      07,2174  0 4762 0          TC      -1CHK
 0249                      07,2175  3 0001 0          CA      L
 0250                      07,2176  0 4762 0          TC      -1CHK

R0251  UNDERFLOW AND OVERFLOW IS LOST IN L REGISTER
 0252                      07,2177  3 4725 0          CA      S+MAX
 0253                      07,2200  6 0000 1          AD      A
 0254                      07,2201  54 001 1          TS      L              OV WITH 37776
 0255                      07,2202  0 4770 0          TC      ERRORS
 0256                      07,2203  4 4725 1          CS      S+MAX
 0257                      07,2204  6 0000 1          AD      A              UV WITH 40001
 0258                      07,2205  22 000 1          LXCH    A              C(A) = 37776, C(L) = 40001
 0259                      07,2206  55,034 0          TS      KEEP1          37776
 0260                      07,2207  0 2211 1          TC      +2
 0261                      07,2210  0 4770 0          TC      ERRORS
 0262                      07,2211  3 0001 0          CA      L
 0263                      07,2212  55,035 1          TS      KEEP2          40001
 0264                      07,2213  0 2215 0          TC      +2
 0265                      07,2214  0 4770 0          TC      ERRORS
 0266                      07,2215  6 1034 1          AD      KEEP1          -0
 0267                      07,2216  0 4754 0          TC      -0CHK

R0268  NORMAL USE OF DXCH
 0269                      07,2217  3 4725 0          CA      S+MAX
 0270                      07,2220  55,035 1          TS      KEEP2          37777, K+1
 0271                      07,2221  4 0000 0          CS      A
 0272                      07,2222  54 001 1          TS      L              40000
 0273                      07,2223  6 4712 1          AD      S+1
 0274                      07,2224  55,034 0          TS      KEEP1          40001, K
 0275                      07,2225  4 0000 0          CS      A              37776
 0276                      07,2226  53,035 1          DXCH    KEEP1
R0277  A = 40001, L = 37777 .......  KEEP1 = 37776, KEEP2 = 40000
 0278                      07,2227  6 0001 0          AD      L
 0279                      07,2230  0 4761 0          TC      -1CHK -1
 0280                      07,2231  3 1034 1          CA      KEEP1
 0281                      07,2232  6 1035 0          AD      KEEP2
 0282                      07,2233  0 4762 0          TC      -1CHK

R0283  NORMAL USE OF DAS (6 CHECKS)
R0284  IF ADDRESS OF K DOES NOT = ZERO, C(L) = +0 AND C(A) = NET OVERFLOW
R0285  C(A) = +0 IF NO OVERFLOW OR UNDERFLOW
R0286  DAD++ WITH NO OVERFLOW
 0287                      07,2234  3 4723 0  DAS++   CAF     S13BITS
 0288                      07,2235  55,034 0          TS      KEEP1          17777
 0289                         07,2236  55'035 1            TS      KEEP2            17777
 0290                         07,2237  54 001 1            TS      L                17777
 0291                         07,2240  6 4712 1            AD      S+1              20000
 0292                         07,2241  21'035 1            DAS     KEEP1
R0293  C(KEEP1) = 37777, C(KEEP2) = 37776
 0294                         07,2242  0 4753 1            TC      -0CHK -1
 0295                         07,2243  56 001 0            XCH     L
 0296                         07,2244  0 4753 1            TC      -0CHK -1
 0297                         07,2245  4 1034 0            CS      KEEP1
 0298                         07,2246  6 1035 0            AD      KEEP2
 0299                         07,2247  0 4762 0            TC      -1CHK
R0300  DAS++ WITH OVERFLOW
 0301                         07,2250  3 4725 0  DAS++OV   CA      S+MAX
 0302                         07,2251  55'034 0            TS      KEEP1            37777
 0303                         07,2252  55'035 1            TS      KEEP2            37777
 0304                         07,2253  54 001 1            TS      L                37777
 0305                         07,2254  3 4712 1            CA      S+1              +1
 0306                         07,2255  21'035 1            DAS     KEEP1
R0307  C(KEEP1) = +1, C(KEEP2) = 37776, C(A) = +1,
 0308                         07,2256  0 4761 0            TC      -1CHK -1
 0309                         07,2257  56 001 0            XCH     L
 0310                         07,2260  0 4753 1            TC      -0CHK -1
 0311                         07,2261  4 1034 0            CS      KEEP1
 0312                         07,2262  0 4762 0            TC      -1CHK
 0313                         07,2263  3 4726 0            CA      S-MAX
 0314                         07,2264  6 1035 0            AD      KEEP2
 0315                         07,2265  0 4762 0            TC      -1CHK
R0316  DAS MIXED SIGNS
 0317                         07,2266  3 4725 0  DAS+--+   CA      S+MAX
 0318                         07,2267  55'034 0            TS      KEEP1            37777
 0319                         07,2270  4 0000 0            CS      A
 0320                         07,2271  55'035 1            TS      KEEP2            40000
 0321                         07,2272  4 0000 0            CS      A
 0322                         07,2273  6 4745 0            AD      S-1
 0323                         07,2274  54 001 1            TS      L                37776
 0324                         07,2275  4 0000 0            CS      A                40001
 0325                         07,2276  21'035 1            DAS     KEEP1
R0326  C(KEEP1) = +1, C(KEEP2) = -1
 0327                         07,2277  0 4753 1            TC      -0CHK -1
 0328                         07,2300  56 001 0            XCH     L
 0329                         07,2301  0 4753 1            TC      -0CHK -1
 0330                         07,2302  3 1034 1            CA      KEEP1
 0331                         07,2303  0 4761 0            TC      -1CHK -1
 0332                         07,2304  3 1035 0            CA      KEEP2
 0333                         07,2305  0 4762 0            TC      -1CHK
R0334  DAS-- WITH NO UNDERFLOW
 0335                         07,2306  4 4723 1  DAS--     CS      S13BITS
 0336                         07,2307  55'034 0            TS      KEEP1            60000
 0337                         07,2310  55'035 1            TS      KEEP2            60000
 0338                         07,2311  54 001 1            TS      L                60000
 0339                       07,2312  6 4745 0           AD     S-1            57777
 0340                       07,2313 21'035 1            DAS    KEEP1
R0341 C(KEEP1) = 40000, C(KEEP2) = 40001
 0342                       07,2314  0 4753 1           TC     -0CHK -1
 0343                       07,2315 56 001 0            XCH    L
 0344                       07,2316  0 4753 1           TC     -0CHK -1
 0345                       07,2317  4 1035 1           CS     KEEP2
 0346                       07,2320  6 1034 1           AD     KEEP1
 0347                       07,2321  0 4762 0           TC     -1CHK
R0348 DAS-- WITH UNDERFLOW
 0349                       07,2322  3 4726 0  DAS--UV  CA     S-MAX
 0350                       07,2323 55'034 0            TS     KEEP1          40000
 0351                       07,2324 55'035 1            TS     KEEP2          40000
 0352                       07,2325 54 001 1            TS     L              40000
 0353                       07,2326  3 4745 0           CA     S-1            -1
 0354                       07,2327 21'035 1            DAS    KEEP1
R0355 C(KEEP1) = -1, C(KEEP2) = 40001, C(A) = -1
 0356                       07,2330  0 4762 0           TC     -1CHK
 0357                       07,2331 56 001 0            XCH    L
 0358                       07,2332  0 4753 1           TC     -0CHK -1
 0359                       07,2333  3 1034 1           CA     KEEP1
 0360                       07,2334  0 4762 0           TC     -1CHK
 0361                       07,2335  3 4725 0           CA     S+MAX
 0362                       07,2336  6 1035 0           AD     KEEP2
 0363                       07,2337  0 4761 0           TC     -1CHK -1
R0364 DAS A.  DOUBLES THE CONTENTS OF THE A REGISTER AND THE L REGISTER.
 0365                       07,2340  3 4726 0           CA     S-MAX
 0366                       07,2341 55'035 1            TS     KEEP2          40000
 0367                       07,2342 54 001 1            TS     L              40000
 0368                       07,2343  4 0000 0           CS     A
 0369                       07,2344 55'034 0            TS     KEEP1          37777
 0370                       07,2345 20 001 1            DAS    A
R0371 C(A) = OV 37775, C(L) = 40001
 0372                       07,2346 55'036 1            TS     KEEP3
 0373                       07,2347  0 4770 0           TC     ERRORS
 0374                       07,2350  3 0001 0           CA     L
 0375                       07,2351  6 1036 0           AD     KEEP3
 0376                       07,2352  0 4762 0           TC     -1CHK

R0377 NORMAL USE OF INDEX WITHOUT EXTRACODE.
R0378 INSTRUCTIONS CHECKED WITH INDEX UP TO FIRST SPACE SKIPPED
R0379 ARE CA, TS, XCH, CCS, AD, TC, TCF, TS WITH OVERFLOW, AND MASK
R0380 FIRST INITIALIZE ERASABLE REGISTERS USED FOR INDEX INSTRUCTION
 0381                       07,2353  3 4711 1           CA     S+ZERO
 0382                       07,2354 55'025 0            TS     NDX+0
 0383                       07,2355  3 4670 1           CA     ADRS6          ADDRESS OF S+MAX
 0384                       07,2356 55'026 0            TS     NDX+MAX
 0385                       07,2357  3 4663 0           CA     ADRS1
 0386                       07,2360 55'027 1            TS     NDXKEEP1
 0387                       07,2361  3 4664 1           CA     ADRS2
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0388                07,2362  55'030 1            TS     NDXKEEP2
0389                07,2363  3 4665 0            CA     ADRS3
0390                07,2364  55'031 0            TS     NDXKEEP3
0391                07,2365  3 4666 0            CA     ADRS4
0392                07,2366  55'032 0            TS     NDXSELF1
0393                07,2367  3 4667 1            CA     ADRS5
0394                07,2370  55'033 1            TS     NDXSELF2
0395                07,2371  51'026 1  NDXCHK    NDX    NDX+MAX         CA S+MAX
0396                07,2372  3 0000 1            CA     0000            A = 37777
0397                07,2373  51'027 0            NDX    NDXKEEP1        TS KEEP1
0398                07,2374  54 000 0            TS     0000            TS WITH NO OV, UV
0399                07,2375  51'025 1            NDX    NDX+0           CS   A
0400                07,2376  4 0000 0            CS     0000            A = 40000
0401                07,2377  51'027 0            NDX    NDXKEEP1        XCH KEEP1
0402                07,2400  56 000 1            XCH    0000            A = +MAX, KEEP1 = - MAX
0403                07,2401  51'025 1            NDX    NDX+0           CCS A
0404                07,2402  10 000 0            CCS    0000            A = 37776
0405                07,2403  0 2407 0            TC     +4
0406                07,2404  0 4770 0            TC     ERRORS
0407                07,2405  0 4770 0            TC     ERRORS
0408                07,2406  0 4770 0            TC     ERRORS
0409                07,2407  51'027 0            NDX    NDXKEEP1        AD KEEP1
0410                07,2410  6 0000 1            AD     0000            A = -1
0411                07,2411  51'032 1  SELF1     NDX    NDXSELF1        TC +2
0412                07,2412  0 0003 1            TC     0003
0413                07,2413  0 4770 0            TC     ERRORS          DID NOT PERFORM A TC
0414                07,2414  51'032 1            NDX    NDXSELF1        TC +2
0415                07,2415  0 0006 1            TC     0006
0416                07,2416  0 2423 0            TC     CNTINU          CHECK C(Q)
0417                07,2417  51'033 0  SELF2     NDX    NDXSELF2        TCF +2
0418                07,2420  1 0003 0            TCF    003
0419                07,2421  0 4770 0            TC     ERRORS
0420                07,2422  0 0002 0            TC     Q               SHOULD GO TO SELF1 +2
0421                07,2423  0 4762 0  CNTINU    TC     -1CHK
0422                07,2424  3 4725 0            CA     S+MAX
0423                07,2425  6 4712 1            AD     S+1
0424                07,2426  51'027 0            NDX    NDXKEEP1        TS KEEP1 WITH OV
0425                07,2427  54 000 0            TS     0000            A = +1, KEEP1 = +0
0426                07,2430  0 4770 0            TC     ERRORS
0427                07,2431  6 1034 1            AD     KEEP1           A = +1
0428                07,2432  51'026 1            NDX    NDX+MAX         MASK S+MAX
0429                07,2433  7 0000 0            MASK   0000            A = +1
0430                07,2434  0 4761 0            TC     -1CHK -1

R0431  INDEX USED WITH ADS, NDX, AND INCR
0432                07,2435  3 4723 0            CA     S13BITS
0433                07,2436  55'034 0            TS     KEEP1
0434                07,2437  51'025 1            NDX    NDX+0           INDEX +0
0435                07,2440  51'027 0            NDX    NDXKEEP1        ADS KEEP1
0436                07,2441  26 000 0            ADS    0000            C(A) AND C(KEEP1) = 377776
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INS     AGC BLK2 INSTRUCTION CHECK                                                USER'S OWN PAGE NO. 10

 0437                           07,2442  51'027 0            NDX     NDXKEEP1        INCR KEEP1
 0438                           07,2443  24 000 1            INCR    0000            C(KEEP1) = 37777
 0439                           07,2444  4 0000 0            CS      A               40001
 0440                           07,2445  6 1034 1            AD      KEEP1           A = +1
 0441                           07,2446  0 4761 0            TC      -1CHK -1
R0442   INDEX USED WITH LXCH, DAS, AND DXCH
 0443                           07,2447  3 4726 0            CA      S-MAX
 0444                           07,2450  55'035 1            TS      KEEP2           KEEP2 HOLDS 40000, KEEP1 HOLDS 37777
 0445                           07,2451  3 4712 1            CA      S+1
 0446                           07,2452  55'036 1            TS      KEEP3           +1
 0447                           07,2453  51'031 1            NDX     NDXKEEP3        LXCH KEEP3
 0448                           07,2454  22 000 1            LXCH    0000            C(L) = +1
 0449                           07,2455  3 4744 1            CA      S-Z
 0450                           07,2456  51'027 0            NDX     NDXKEEP1        DAS KEEP1
 0451                           07,2457  20 001 1            DAS     0000
R0452   BEFORE DAS, K = 37777   K+1 = 40000
R0453               A = -2      L   = +1
R0454   AFTER  DAS, K = 37775   K+1 = 40001
R0455             A = +0        L   = +0
 0456                           07,2460  51'027 0            NDX     NDXKEEP1        DXCH KEEP1
 0457                           07,2461  52 001 1            DXCH    0000
 0458                           07,2462  6 0001 0            AD      L
 0459                           07,2463  0 4762 0            TC      -1CHK
 0460                           07,2464  4 1034 0            CS      KEEP1
 0461                           07,2465  0 4754 0            TC      -0CHK
 0462                           07,2466  3 1035 0            CA      KEEP2
 0463                           07,2467  0 4753 1            TC      -0CHK -1
R0464   INDEX INSTRUCTION USED WITH OVERFLOW
 0465                           07,2470  3 4671 0            CA      ADRS7           ADDRESS OF SELF3
 0466                           07,2471  6 4707 0            AD      SBIT14
 0467                           07,2472  55'042 1            TS      KEEP7
 0468                           07,2473  51'042 0  SELF3     NDX     KEEP7
 0469                           07,2474  2 0003 0            2       0002
 0470                           07,2475  0 4770 0            TC      ERRORS
R04701  CHECK INDEX OF AN SC REGISTER
 04702                          07,2476  3 4663 0            CA      ADRS1           01371, ADDRESS OF KEEP1
 04703                          07,2477  50 000 1            NDX     A
 04704                          07,2500  54 000 0            TS      0000            PUT 01371 IN KEEP1
 04705                          07,2501  4 0000 0            CS      A
 04706                          07,2502  6 1034 1            AD      KEEP1
 04707                          07,2503  0 4754 0            TC      -0CHK
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INS     AGC BLK2 INSTRUCTION CHECK                                                         USER'S OWN PAGE NO.  11

P0471   START CHECKING EXTRACODE INSTRUCTIONS
R0472   NORMAL USE OF DCA, DCS, AND SU
 0473                         07,2504  0 0006 1  STRTXTRA EXTEND
 0474                         07,2505  3 4673 1           DCA      SBIT1
R0475   C(A) = +1, C(L) = +2
 0476                         07,2506  55'035 1           TS       KEEP2             +1
 0477                         07,2507  56 001 0           XCH      L
 0478                         07,2510  55'034 0           TS       KEEP1             +2
 0479                         07,2511  0 0006 1           EXTEND
 0480                         07,2512  61'035 0           SU       KEEP2             C(KEEP2) = +1
 0481                         07,2513  0 4761 0           TC       -1CHK -1
 0482                         07,2514  0 0006 1           EXTEND
 0483                         07,2515  4 1035 1           DCS      KEEP1
R0484   C(A) = -2, C(L) = -1
 0485                         07,2516  0 0006 1           EXTEND
 0486                         07,2517  60 001 0           SU       L
 0487                         07,2520  0 4762 0           TC       -1CHK
R0488   COMPLEMENTING OF THE DOUBLE PRECISION ACCUMULATOR
 0489                         07,2521  3 4725 0           CA       S+MAX
 0490                         07,2522  54 001 1           TS       L                 37777
 0491                         07,2523  6 0000 1           AD       A                 OV37776
 0492                         07,2524  0 0006 1           EXTEND
 0493                         07,2525  4 0001 1           DCS      A
 0494                         07,2526  55'034 0           TS       KEEP1
 0495                         07,2527  0 4770 0           TC       ERRORS
 0496                         07,2530  3 1034 1           CA       KEEP1
 0497                         07,2531  0 0006 1           EXTEND
 0498                         07,2532  60 001 0           SU       L
 0499                         07,2533  0 4761 0           TC       -1CHK -1
R04991  CHECKS DCA OF AN SC REGISTER
 04992                        07,2534  3 4744 1           CA       S-2
 04993                        07,2535  54 002 1           TS       Q                 -2
 04994                        07,2536  3 4712 1           CA       S+1
 04995                        07,2537  54 001 1           TS       L                 +1
 04996                        07,2540  3 4701 0           CA       SBIT8
 04997                        07,2541  0 0006 1           EXTEND
 04998                        07,2542  3 0002 0           DCA      L
 049981                       07,2543  6 0001 0           AD       L                 -1
 04999                        07,2544  0 4762 0           TC       -1CHK

R0500   NORMAL USE OF QXCH
 0501                         07,2545  3 2555 0           CA       QXCHCON1
 0502                         07,2546  55'034 0           TS       KEEP1             STORE ADDRESS OF AUGCHK IN KEEP1
 0503                         07,2547  0 2551 1           TC       +2                Q NOW HOLDS ADDRESS OF QNMBR
 0504                         07,2550  0 4770 0  QNMBR    TC       ERRORS
 0505                         07,2551  0 0006 1           EXTEND
 0506                         07,2552  23'034 1           QXCH     KEEP1             Q NOW HOLDS ADDRESS OF AUGCHK
 0507                         07,2553  0 0002 0           TC       Q                 SHOULD GO TO QXCHCON2 +1, NOT QNMBR
 0508                         07,2554  0 4770 0           TC       ERRORS
 0509                         07,2555    02557 1  QXCHCON1 ADRES    QXCHCON2 +1
 0510                     07,2556   02550 0  QXCHCON2 ADRES   QNMBR
 0511                     07,2557  4 1034 0           CS      KEEP1              CHECK THAT KEEP1 HOLDS B(Q)
 0512                     07,2560  6 2556 0           AD      QXCHCON2
 0513                     07,2561  0 4754 0           TC      -0CHK
R05131   CHECKS QXCH OF AN SC REGISTER
 05132                    07,2562  3 4711 1           CA      S+ZERO
 05133                    07,2563  0 2565 0           TC      +2
 05134                    07,2564  1 2571 1           TCF     +5
 05135                    07,2565  0 0006 1           EXTEND
 05136                    07,2566  22 000 1           QXCH    A
 051361                   07,2567  22 002 0           LXCH    Q
 05137                    07,2570  0 0000 1           TC      A
 05138                    07,2571  3 0001 0           CA      L
 05139                    07,2572  0 4753 1           TC      -0CHK -1

R0514    NORMAL USE OF AUG
 0515                     07,2573  3 4711 1  AUGCHK   CA      S+ZERO
 0516                     07,2574  55'034 0           TS      KEEP1              +0
 0517                     07,2575  4 0000 0           CS      A
 0518                     07,2576  55'035 1           TS      KEEP2              -0
 0519                     07,2577  0 0006 1           EXTEND
 0520                     07,2600  25'034 1           AUG     KEEP1              +1
 0521                     07,2601  0 0006 1           EXTEND
 0522                     07,2602  25'034 1           AUG     KEEP1              +2
 0523                     07,2603  0 4754 0           TC      -0CHK              CHECK C(A) HAS NOT CHANGED
 0524                     07,2604  0 0006 1           EXTEND
 0525                     07,2605  25'035 0           AUG     KEEP2              -1
 0526                     07,2606  0 0006 1           EXTEND
 0527                     07,2607  25'035 0           AUG     KEEP2              -2
 0528                     07,2610  0 0006 1           EXTEND
 0529                     07,2611  25'035 0           AUG     KEEP2              -3
 0530                     07,2612  0 4753 1           TC      -0CHK -1
 0531                     07,2613  3 1035 0           CA      KEEP2
 0532                     07,2614  6 1034 1           AD      KEEP1
 0533                     07,2615  0 4762 0           TC      -1CHK
R05331   CHECKS AUG OF AN SC REGISTER
 05332                    07,2616  3 4746 0           CA      S-ZERO
 05333                    07,2617  0 0006 1           EXTEND
 05334                    07,2620  24 000 1           AUG     A
 05335                    07,2621  0 4762 0           TC      -1CHK

R0534    NORMAL USE OF DIM
 0535                     07,2622  3 4711 1  DIMCHK   CA      S+ZERO
 0536                     07,2623  55'034 0           TS      KEEP1              +0
 0537                     07,2624  0 0006 1           EXTEND
 0538                     07,2625  27'034 0           DIM     KEEP1
 0539                     07,2626  3 1034 1           CA      KEEP1
 0540                     07,2627  0 4753 1           TC      -0CHK -1
 0541                     07,2630  4 0000 0           CS      A
 0542                     07,2631  55'034 0           TS      KEEP1              -0
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 0543                       07,2632  0 0006 1        EXTEND
 0544                       07,2633  27'034 0        DIM     KEEP1
 0545                       07,2634  3 1034 1        CA      KEEP1
 0546                       07,2635  0 4754 0        TC      -0CHK
 0547                       07,2636  3 4713 0        CA      S+2
 0548                       07,2637  55'034 0        TS      KEEP1              +2
 0549                       07,2640  0 0006 1        EXTEND
 0550                       07,2641  27'034 0        DIM     KEEP1              +1
 0551                       07,2642  6 4745 0        AD      S-1
 0552                       07,2643  0 4761 0        TC      -1CHK -1           CHECK C(A) HAS NOT CHANGED
 0553                       07,2644  3 1034 1        CA      KEEP1
 0554                       07,2645  0 4761 0        TC      -1CHK -1
 0555                       07,2646  0 0006 1        EXTEND
 0556                       07,2647  27'034 0        DIM     KEEP1
 0557                       07,2650  0 4753 1        TC      -0CHK -1
 0558                       07,2651  3 1034 1        CA      KEEP1
 0559                       07,2652  0 4754 0        TC      -0CHK
 0560                       07,2653  4 4713 1        CS      S+2
 0561                       07,2654  55'035 1        TS      KEEP2              -2
 0562                       07,2655  0 0006 1        EXTEND
 0563                       07,2656  27'035 1        DIM     KEEP2              -1
 0564                       07,2657  3 1035 0        CA      KEEP2
 0565                       07,2660  0 4762 0        TC      -1CHK
 0566                       07,2661  0 0006 1        EXTEND
 0567                       07,2662  27'035 1        DIM     KEEP2              -0
 0568                       07,2663  0 4753 1        TC      -0CHK -1
 0569                       07,2664  3 1035 0        CA      KEEP2
 0570                       07,2665  0 4754 0        TC      -0CHK
R05701  CHECKS DIM OF AN SC REGISTER
 05702                      07,2666  3 4744 1        CA      S-2
 05703                      07,2667  0 0006 1        EXTEND
 05704                      07,2670  26 000 0        DIM     A
 05705                      07,2671  0 4762 0        TC      -1CHK

R0571   NORMAL USE OF MSU
R0572   MSU SAME (S+MAX AND S+MAX), RESULT +0
 0573                       07,2672  3 4725 0        CA      S+MAX
 0574                       07,2673  55'034 0        TS      KEEP1
 0575                       07,2674  0 0006 1        EXTEND
 0576                       07,2675  21'034 0        MSU     KEEP1
 0577                       07,2676  0 4753 1        TC      -0CHK -1
R0578   MSU SAME (+0 AND +0), RESULT +0
 0579                       07,2677  55'035 1        TS      KEEP2
 0580                       07,2700  0 0006 1        EXTEND
 0581                       07,2701  21'035 1        MSU     KEEP2
 0582                       07,2702  0 4753 1        TC      -0CHK -1
R0583   MSU SAME (-0 AND -0), RESULT +0
 0584                       07,2703  3 4746 0        CA      S-ZERO
 0585                       07,2704  55'036 1        TS      KEEP3
 0586                       07,2705  0 0006 1        EXTEND
 0587                          07,2706  21'036 1            MSU      KEEP3
 0588                          07,2707  0 4753 1            TC       -0CHK -1
R0589   MSU +0 AND 77777, RESULT = +1
 0590                          07,2710  0 0006 1            EXTEND
 0591                          07,2711  21'036 1            MSU      KEEP3
 0592                          07,2712  0 4761 0            TC       -1CHK -1
R0593   MSU 77777 AND +0, RESULT = -1
 0594                          07,2713  4 0000 0            CS       A
 0595                          07,2714  0 0006 1            EXTEND
 0596                          07,2715  21'035 1            MSU      KEEP2
 0597                          07,2716  0 4762 0            TC       -1CHK
R0598   MSU +6 AND +7, RESULT = -1
 0599                          07,2717  3 4720 0            CA       S+7
 0600                          07,2720  55'037 0            TS       KEEP4
 0601                          07,2721  3 4717 1            CA       S+6
 0602                          07,2722  55'040 0            TS       KEEP5
 0603                          07,2723  0 0006 1            EXTEND
 0604                          07,2724  21'037 0            MSU      KEEP4
 0605                          07,2725  0 4762 0            TC       -1CHK
R0606   MSU +7 AND +6, RESULT = +1
 0607                          07,2726  3 4720 0            CA       S+7
 0608                          07,2727  0 0006 1            EXTEND
 0609                          07,2730  21'040 0            MSU      KEEP5
 0610                          07,2731  0 4761 0            TC       -1CHK -1
R0611   MSU 77770 AND 77771, RESULT = -1
 0612                          07,2732  3 4740 0            CA       S-6
 0613                          07,2733  55'041 1            TS       KEEP6
 0614                          07,2734  3 4737 0            CA       S-7
 0615                          07,2735  55'042 1            TS       KEEP7
 0616                          07,2736  0 0006 1            EXTEND
 0617                          07,2737  21'041 1            MSU      KEEP6
 0618                          07,2740  0 4762 0            TC       -1CHK
R0619   MSU 77771 AND 77770, RESULT = +1
 0620                          07,2741  3 4740 0            CA       S-6
 0621                          07,2742  0 0006 1            EXTEND
 0622                          07,2743  21'042 1            MSU        KEEP7
 0623                          07,2744  0 4761 0            TC       -1CHK -1
R06231  CHECKS MSU OF AN SC REGISTER ( -0 AND -0 = +0)
 06232                         07,2745  3 4746 0            CA       S_ZERO
 06233                         07,2746  54 001 1            TS       L
 06234                         07,2747  0 0006 1            EXTEND
 06235                         07,2750  20 001 1            MSU      L
 06236                         07,2751  0 4753 1            TC       -0CHK -1

R0624   NORMAL USE OF BZF
 0625                          07,2752  0 2754 0  BZFCHK    TC       +2
 0626                          07,2753  0 2774 1            TC       BZMFCHK            CORRECT ADDRESS IN Q
 0627                          07,2754  3 4716 0            CAF      S+5
 0628                          07,2755  0 0006 1            EXTEND
 0629                          07,2756  1 4770 1            BZF      ERRORS
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0630                      07,2757  4 0000 0            CS       A
0631                      07,2760  0 0006 1            EXTEND
0632                      07,2761  1 4770 1            BZF      ERRORS
0633                      07,2762  3 4711 1            CAF      S+ZERO
0634                      07,2763  0 0006 1            EXTEND
0635                      07,2764  1 2766 0            BZF      +2
0636                      07,2765  0 4770 0            TC       ERRORS
0637                      07,2766  4 0000 0            CS       A
0638                      07,2767  0 0006 1            EXTEND
0639                      07,2770  1 2772 0            BZF      +2
0640                      07,2771  0 4770 0            TC       ERRORS
0641                      07,2772  0 0002 0            TC       Q                SHOULD GO TO BZFCHK +1
0642                      07,2773  0 4770 0            TC       ERRORS

0643                      07,2774  0 2776 0  BZMFCHK   TC       +2
0644                      07,2775  0 3017 1            TC       MP1++            CORRECT ADDRESS IN Q
0645                      07,2776  3 4702 0            CAF      SBIT9
0646                      07,2777  0 0006 1            EXTEND
0647                      07,3000  6 4770 0            BZMF     ERRORS
0648                      07,3001  4 0000 0            CS       A
0649                      07,3002  0 0006 1            EXTEND
0650                      07,3003  6 3005 1            BZMF     +2
0651                      07,3004  0 4770 0            TC       ERRORS
0652                      07,3005  3 4711 1            CA       S+ZERO
0653                      07,3006  0 0006 1            EXTEND
0654                      07,3007  6 3011 1            BZMF     +2
0655                      07,3010  0 4770 0            TC       ERRORS
0656                      07,3011  4 0000 0            CS       A
0657                      07,3012  0 0006 1            EXTEND
0658                      07,3013  6 3015 0            BZMF     +2
0659                      07,3014  0 4770 0            TC       ERRORS
0660                      07,3015  0 0002 0            TC       Q                SHOULD GO TO BZMFCHK +1
0661                      07,3016  0 4770 0            TC       ERRORS

R0662  NORMAL USE OF MP
R0663  37777 X 2
0664                      07,3017  3 4725 0  MP1++     CA       S+MAX            37777
0665                      07,3020  0 0006 1            EXTEND
0666                      07,3021  7 4713 1            MP       S+2              C(A) = +1, C(L. = 37776
0667                      07,3022  6 0001 0            AD       L
0668                      07,3023  55'034 0            TS       KEEP1            37777
0669                      07,3024  0 0006 1  MP1+-     EXTEND
0670                      07,3025  7 4744 0            MP       S-2              C(A) = -1, C(L) = 40001
0671                      07,3026  6 0001 0            AD       L
0672                      07,3027  55'035 1            TS       KEEP2            40000
0673                      07,3030  0 0006 1  MP1-+     EXTEND
0674                      07,3031  7 4713 1            MP       S+2              C(A) = -1, C(L) = 40001
0675                      07,3032  6 0001 0            AD       L
0676                      07,3033  55'036 1            TS       KEEP3            40000
0677                      07,3034  0 0006 1  MP1--     EXTEND
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 0678                          07,3035  7 4744 0              MP        S-2               C(A) = +1, C(L) = 37776
 0679                          07,3036  6 0001 0              AD        L                 37777
 0680                          07,3037  6 1036 0              AD        KEEP3             77777
 0681                          07,3040  6 1035 0              AD        KEEP2             40000
 0682                          07,3041  6 1034 1              AD        KEEP1             77777
 0683                          07,3042  0 4754 0              TC        -0CHK
R0684   37777 X 37777
 0685                          07,3043  3 4725 0  MP2++       CA        S+MAX             37777
 0686                          07,3044  0 0006 1              EXTEND                      CHECKS RSC PULSE
 0687                          07,3045  7 0000 0              MP        A                 C(A) = 37776, C(L) = +1
 0688                          07,3046  6 0001 0              AD        L
 0689                          07,3047  55'034 0              TS        KEEP1             37777
 0690                          07,3050  0 0006 1  MP2+-       EXTEND
 0691                          07,3051  7 4726 1              MP        S-MAX             C(A) = 40001, C(L) = -1
 0692                          07,3052  6 0001 0              AD        L
 0693                          07,3053  55'035 1              TS        KEEP2             40000
 0694                          07,3054  0 0006 1  MP2-+       EXTEND
 0695                          07,3055  7 4725 1              MP        S+MAX             C(A) = 40001, C(L) = -1
 0696                          07,3056  6 0001 0              AD        L
 0697                          07,3057  55'036 1              TS        KEEP3             40000
 0698                          07,3060  0 0006 1  MP2--       EXTEND
 0699                          07,3061  7 4726 1              MP        S-MAX             C(A) = 37776, C(L) = +1
 0700                          07,3062  6 0001 0              AD        L                 37777
 0701                          07,3063  6 1036 0              AD        KEEP3             77777
 0702                          07,3064  6 1035 0              AD        KEEP2             40000
 0703                          07,3065  6 1034 1              AD        KEEP1             77777
 0704                          07,3066  0 4754 0              TC        -0CHK
R0705   C(A) = NON-ZERO, C(K) = ZERO
R0706   RESULT IS ALWAYS POSITIVE ZERO
 0707                          07,3067  3 4725 0  MP3++       CA        S+MAX             37777
 0708                          07,3070  0 0006 1              EXTEND
 0709                          07,3071  7 4711 0              MP        S+ZERO
 0710                          07,3072  6 0001 0              AD        L
 0711                          07,3073  0 4753 1              TC        -0CHK -1
 0712                          07,3074  3 4712 1  MP3+-       CA        S+1
 0713                          07,3075  0 0006 1              EXTEND
 0714                          07,3076  7 4746 1              MP        S-ZERO
 0715                          07,3077  6 0001 0              AD        L
 0716                          07,3100  0 4753 1              TC        -0CHK -1
 0717                          07,3101  3 4745 0  MP3-+       CA        S-1
 0718                          07,3102  0 0006 1              EXTEND
 0719                          07,3103  7 4711 0              MP        S+ZERO
 0720                          07,3104  6 0001 0              AD        L
 0721                          07,3105  0 4753 1              TC        -0CHK -1
 0722                          07,3106  3 4746 0  MP3--       CA        S-ZERO
 0723                          07,3107  0 0006 1              EXTEND
 0724                          07,3110  7 4746 1              MP        S-ZERO
 0725                          07,3111  6 0001 0              AD        L
 0726                          07,3112  0 4753 1              TC        -0CHK -1
R0727   C(A) = ZERO, C(K) = NON-ZERO,
R0728   RESULT IS + ZERO FOR A POSITIVE SIGN AND NEGATIVE
R0729   ZERO FOR Z NEGATIVE SIGN
 0730                       07,3113  3 4711 1  MP4++      CA      S+ZERO
 0731                       07,3114  0 0006 1             EXTEND
 0732                       07,3115  7 4725 1             MP      S+MAX
 0733                       07,3116  6 0001 0             AD      L
 0734                       07,3117  0 4753 1             TC      -0CHK -1
 0735                       07,3120  0 0006 1  MP4+-      EXTEND
 0736                       07,3121  7 4745 1             MP      S-1
 0737                       07,3122  6 0001 0             AD      L
 0738                       07,3123  0 4754 0             TC      -0CHK
 0739                       07,3124  4 0000 0  MP4-+      CS      A
 0740                       07,3125  0 0006 1             EXTEND
 0741                       07,3126  7 4716 1             MP      S+5
 0742                       07,3127  6 0001 0             AD      L
 0743                       07,3130  0 4754 0             TC      -0CHK
 0744                       07,3131  4 0000 0  MP4--      CS      A
 0745                       07,3132  0 0006 1             EXTEND
 0746                       07,3133  7 4746 1             MP      S-ZERO
 0747                       07,3134  6 0001 0             AD      L
 0748                       07,3135  0 4753 1             TC      -0CHK -1
R0749   MULTIPLY ZERO X ZERO
R0750   RESULT IS ALWAYS PLUS ZERO
 0751                       07,3136  3 4711 1  MP5++      CA      S+ZERO
 0752                       07,3137  55'034 0             TS      KEEP1
 0753                       07,3140  0 0006 1             EXTEND
 0754                       07,3141  7 1034 0             MP      KEEP1
 0755                       07,3142  6 0001 0             AD      L
 0756                       07,3143  0 4753 1             TC      -0CHK -1
 0757                       07,3144  0 0006 1  MP5+-      EXTEND
 0758                       07,3145  7 4746 1             MP      S-ZERO
 0759                       07,3146  6 0001 0             AD      L
 0760                       07,3147  0 4753 1             TC      -0CHK -1
 0761                       07,3150  3 4746 0  MP5-+      CA      S-ZERO
 0762                       07,3151  0 0006 1             EXTEND
 0763                       07,3152  7 4711 0             MP      S+ZERO
 0764                       07,3153  6 0001 0             AD      L
 0765                       07,3154  0 4753 1             TC      -0CHK -1
 0766                       07,3155  3 4746 0  MP5--      CA      S-ZERO
 0767                       07,3156  0 0006 1             EXTEND
 0768                       07,3157  7 4746 1             MP      S-ZERO
 0769                       07,3160  0 4753 1             TC      -0CHK -1

 07691                      07,3161  3 3163 0             CA      CONTINU
 07692                      07,3162  0 4105 1             TC      BANKJUMP
 07693                      07,3163   20000 0  CONTINU    CADR    DV1++ -1         CONTINUE WITH INSTRUCTION CHECK

 07694                                10,2000             SETLOC  30000

 07695                      10,2000  0 4224 1             TC      CHECKNJ          CHECK FOR NEW JOB
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R0770     NORMAL USE OF DV ... REMAINDER HAS SIGN OF DIVIDEND
R0771     1/4 DIVIDED BY 3/8
R0772     C(A) = 25252 WITH A + QUOTIENT AND 52525 WITH A - QUOTIENT.
R0773     C(L) = REMAINDER = /100000/ WITH SIGN OF DIVIDEND.
 0774                      10,2001  3 4747 1  DV1++     CA      DV1CON        14000
 0775                      10,2002  55'042 1            TS      KEEP7         14000, +3/8
 07751                     10,2003  54 002 1            TS      Q
 0776                      10,2004  4 0000 0            CS      A
 0777                      10,2005  55'041 1            TS      KEEP6         63000, -3/8
 0778                      10,2006  3 4711 1            CA      S+ZERO
 0779                      10,2007  54 001 1            TS      L
 0780                      10,2010  3 4706 1            CA      SBIT13        10000
 0781                      10,2011  0 0006 1            EXTEND
 0782                      10,2012  10 002 1            DV      Q             CHECKS RSC PULSE
 0783                      10,2013  55'034 0            TS      KEEP1         25252
 0784                      10,2014  3 4711 1            CA      S+ZERO
 0785                      10,2015  22 000 1  DV1+-     LXCH    A
 0786                      10,2016  0 0006 1            EXTEND
 0787                      10,2017  11'041 1            DV      KEEP6
 0788                      10,2020  6 1034 1            AD      KEEP1
 0789                      10,2021  0 4754 0            TC      -0CHK
 0790                      10,2022  3 4746 0            CA      S-ZERO
 0791                      10,2023  22 000 1            LXCH    A
 0792                      10,2024  4 0000 0  DV1-+     CS      A
 0793                      10,2025  0 0006 1            EXTEND
 0794                      10,2026  11'042 1            DV      KEEP7
 0795                      10,2027  55'034 0            TS      KEEP1         52525
 0796                      10,2030  3 4746 0            CA      S-ZERO
 0797                      10,2031  22 000 1  DV1--     LXCH    A
 0798                      10,2032  0 0006 1            EXTEND
 0799                      10,2033  11'041 1            DV      KEEP6
 0800                      10,2034  6 1034 1            AD      KEEP1
 0801                      10,2035  0 4754 0            TC      -0CHK
 0802                      10,2036  3 0001 0            CA      L
 0803                      10,2037  6 4706 1            AD      SBIT13
 0804                      10,2040  0 4754 0            TC      -0CHK
R0805     1/2 TO 15TH DIVIDED BY 1/2 TO 14TH
R0806     C(A) SHOULD BE 1/2 AND CONTENTS OF L SHOULD BE ZERO
 0807                      10,2041  3 4712 1  DV2++     CA      S+1
 0808                      10,2042  55'042 1            TS      KEEP7         00001, DIVISOR
 0809                      10,2043  4 0000 0            CS      A
 0810                      10,2044  55'041 1            TS      KEEP6         77776, DIVISOR
 0811                      10,2045  3 4711 1            CA      S+ZERO
 0812                      10,2046  3 4707 0            CA      SBIT14        20000
 0813                      10,2047  54 001 1            TS      L
 0814                      10,2050  3 4711 1            CA      S+ZERO
 0815                      10,2051  0 0006 1            EXTEND
 0816                      10,2052  11'042 1            DV      KEEP7         C(A) = 1/2, C(L) = +0
 0817                      10,2053  55'034 0            TS      KEEP1
 0818                      10,2054  22 000 1  DV2+-     LXCH    A
 0819                    10,2055  0 0006 1           EXTEND
 0820                    10,2056  11'041 1           DV      KEEP6
 0821                    10,2057  55'035 1           TS      KEEP2           -1/2
 0822                    10,2060  6 1034 1           AD      KEEP1
 0823                    10,2061  0 4754 0           TC      -0CHK
 0824                    10,2062  3 1035 0           CA      KEEP2
 0825                    10,2063  22 000 1           LXCH    A
 0826                    10,2064  4 0000 0  DV2-+    CS      A
 0827                    10,2065  0 0006 1           EXTEND
 0828                    10,2066  11'042 1           DV      KEEP7
 0829                    10,2067  55'035 1           TS      KEEP2
 0830                    10,2070  22 000 1  DV2--    LXCH    A
 0831                    10,2071  0 0006 1           EXTEND
 0832                    10,2072  11'041 1           DV      KEEP6
 0833                    10,2073  55'034 0           TS      KEEP1
 0834                    10,2074  6 1035 0           AD      KEEP2
 0835                    10,2075  0 4754 0           TC      -0CHK
 0836                    10,2076  4 1034 0           CS      KEEP1          MAKE SURE QUOTIENT IS 1/2
 0837                    10,2077  6 4707 0           AD      SBIT14
 0838                    10,2100  0 4754 0           TC      -0CHK
 0839                    10,2101  3 0001 0           CA      L
 0840                    10,2102  0 4754 0           TC      -0CHK
R0841   SAME AS PREVIOUS DIVISION EXCEPT A AND L WILL HAVE OPPOSITE SIGNS
R0842   BEFORE DIVISION.  SINCE A WILL ALWAYS BE ZERO, THE SIGN OF THE QUOTIENT
R0843   WILL DEPEND ON THE SIGN OF L AND THE SIGN OF THE DIVISOR.
 0844                    10,2103  3 4707 0  DV3++    CA      SBIT14          20000
 0845                    10,2104  54 001 1           TS      L
 0846                    10,2105  3 4746 0           CA      S-ZERO
 0847                    10,2106  0 0006 1           EXTEND
 0848                    10,2107  11'042 1           DV      KEEP7
 0849                    10,2110  55'034 0           TS      KEEP1           20000
 0850                    10,2111  22 000 1  DV3+-    LXCH    A
 0851                    10,2112  4 0000 0           CS      A               A = -0
 0852                    10,2113  0 0006 1           EXTEND
 0853                    10,2114  11'041 1           DV      KEEP6
 0854                    10,2115  6 1034 1           AD      KEEP1
 0855                    10,2116  0 4754 0           TC      -0CHK
 0856                    10,2117  4 4707 1           CS      SBIT14          -1/2
 0857                    10,2120  22 000 1  DV3-+    LXCH    A
 0858                    10,2121  0 0006 1           EXTEND
 0859                    10,2122  11'042 1           DV      KEEP7
 0860                    10,2123  55'034 0           TS      KEEP1
 0861                    10,2124  22 000 1  DV3--    LXCH    A
 0862                    10,2125  4 0000 0           CS      A               A = +0
 0863                    10,2126  0 0006 1           EXTEND
 0864                    10,2127  11'041 1           DV      KEEP6
 0865                    10,2130  6 1034 1           AD      KEEP1
 0866                    10,2131  0 4754 0           TC      -0CHK
 0867                    10,2132  4 0001 1           CS      L
 0868                    10,2133  0 4753 1           TC      -0CHK -1
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R0869   C(A) = 17777 AND C(L) = 37777.  THIS IS DIVIDED BY 20000.  THE RESULT
R0870   SHOULD BE +-/37777/ AND THE REMAINDER +-/17777/
 0871                     10,2134  3 4725 0  DV4++    CA      S+MAX
 0872                     10,2135  54 001 1           TS      L
 0873                     10,2136  3 4707 0           CA      SBIT14
 0874                     10,2137  55'042 1           TS      KEEP7           20000
 0875                     10,2140  4 0000 0           CS      A
 0876                     10,2141  55'041 1           TS      KEEP6           57777
 0877                     10,2142  3 4723 0           CA      S13BITS         17777
 0878                     10,2143  0 0006 1           EXTEND
 0879                     10,2144  11'042 1           DV      KEEP7
 0880                     10,2145  55'034 0           TS      KEEP1
 0881                     10,2146  22 000 1  DV4+-    LXCH    A
 0882                     10,2147  0 0006 1           EXTEND
 0883                     10,2150  11'041 1           DV      KEEP6
 0884                     10,2151  55'035 1           TS      KEEP2
 0885                     10,2152  6 1034 1           AD      KEEP1
 0886                     10,2153  0 4754 0           TC      -0CHK
 0887                     10,2154  3 1035 0           CA      KEEP2
 0888                     10,2155  22 000 1           LXCH    A
 0889                     10,2156  4 0000 0  DV4-+    CS      A
 0890                     10,2157  0 0006 1           EXTEND
 0891                     10,2160  11'042 1           DV      KEEP7
 0892                     10,2161  6 1034 1           AD      KEEP1
 0893                     10,2162  0 4754 0           TC      -0CHK
 0894                     10,2163  3 1035 0           CA      KEEP2
 0895                     10,2164  22 000 1  DV4--    LXCH    A
 0896                     10,2165  0 0006 1           EXTEND
 0897                     10,2166  11'041 1           DV      KEEP6
 0898                     10,2167  55'036 1           TS      KEEP3
 0899                     10,2170  6 1035 0           AD      KEEP2
 0900                     10,2171  0 4754 0           TC      -0CHK
 0901                     10,2172  4 1036 1           CS      KEEP3
 0902                     10,2173  6 4725 0           AD      S+MAX
 0903                     10,2174  0 4754 0           TC      -0CHK
 0904                     10,2175  3 0001 0           CA      L
 0905                     10,2176  6 4723 0           AD      S13BITS
 0906                     10,2177  0 4754 0           TC      -0CHK
R0907   C(A) = +-/17777/ AND C(L) = +-/37777/ WITH OPPOSITE SIGN BEFORE DEVISION
R0908   THE QUOTIENT SHOULD BE +-/37774/ WITH THE SIGN DEPENDING ON THE SIGN OF
R0909   A AND THE SIGN OF THE DEVISOR. THE C(L) = +-/1/ DEPENDING ON THE SIGN
R0910   OF A.
 0911                     10,2200  4 4725 1  DV5++    CS      S+MAX
 0912                     10,2201  54 001 1           TS      L               40000
 0913                     10,2202  3 4723 0           CA      S13BITS         17777
 0914                     10,2203  0 0006 1           EXTEND
 0915                     10,2204  11'042 1           DV      KEEP7
 0916                     10,2205  55'034 0           TS      KEEP1           37774
 0917                     10,2206  56 001 0           XCH     L
 0918                     10,2207  0 4761 0           TC      -1CHK -1
```

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0919                       10,2210  3 4726 0  DV5+-     CA      S-MAX
0920                       10,2211  54 001 1            TS      L                  40000
0921                       10,2212  3 4723 0            CA      S13BITS            17777
0922                       10,2213  0 0006 1            EXTEND
0923                       10,2214  11'041 1            DV      KEEP6              C(A) = -37774, C(L) = +1
0924                       10,2215  6 1034 1            AD      KEEP1
0925                       10,2216  0 4754 0            TC      -0CHK
0926                       10,2217  56 001 0            XCH     L
0927                       10,2220  0 4761 0            TC      -1CHK -1
0928                       10,2221  3 4725 0  DV5-+     CA      S+MAX
0929                       10,2222  54 001 1            TS      L                  37777
0930                       10,2223  4 4723 1            CS      S13BITS            60000
0931                       10,2224  0 0006 1            EXTEND
0932                       10,2225  11'042 1            DV      KEEP7              C(A) = -37774, C(L) = -1
0933                       10,2226  55'035 1            TS      KEEP2
0934                       10,2227  6 1034 1            AD      KEEP1
0935                       10,2230  0 4754 0            TC      -0CHK
0936                       10,2231  56 001 0            XCH     L
0937                       10,2232  0 4762 0            TC      -1CHK
0938                       10,2233  3 4725 0  DV5--     CA      S+MAX
0939                       10,2234  54 001 1            TS      L                  37777
0940                       10,2235  4 4723 1            CS      S13BITS            60000
0941                       10,2236  0 0006 1            EXTEND
0942                       10,2237  11'041 1            DV      KEEP6              C(A) = 37774, C(L) = -1
0943                       10,2240  6 1035 0            AD      KEEP2
0944                       10,2241  0 4754 0            TC      -0CHK
0945                       10,2242  56 001 0            XCH     L
0946                       10,2243  0 4762 0            TC      -1CHK
0947                       10,2244  3 1035 0            CA      KEEP2              -37774
0948                       10,2245  6 4744 1            AD      S-2                -37776
0949                       10,2246  6 4725 0            AD      S+MAX              +1
0950                       10,2247  0 4761 0            TC      -1CHK -1           CHECK THAT QUOTIENT IS +-/37774/

R0951  DIVIDE SAME (37776).  THE RESULT SHOULD BE MAXIMUM AND THE REMAINDER
R0952  SHOULD BE THE SAME VALUE AS THE DIVISOR WITH THE SAME SIGN AS THE
R0953  DIVIDEND
0954                       10,2250  3 4711 1  DV6++     CA      S+ZERO
0955                       10,2251  54 001 1            TS      L
0956                       10,2252  4 4750 0            CS      DV2CON             37776
0957                       10,2253  55'041 1            TS      KEEP6              40001
0958                       10,2254  4 0000 0            CS      A
0959                       10,2255  55'042 1            TS      KEEP7              37776
0960                       10,2256  0 0006 1            EXTEND
0961                       10,2257  11'042 1            DV      KEEP7
0962                       10,2260  4 0000 0            CS      A
0963                       10,2261  6 0001 0            AD      L
0964                       10,2262  0 4762 0            TC      -1CHK
0965                       10,2263  3 4711 1            CA      S+ZERO
0966                       10,2264  22 000 1  DV6+-     LXCH    A
0967                       10,2265  0 0006 1            EXTEND
```

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 0968                        10,2266  11'041 1            DV      KEEP6
 0969                        10,2267  6 0001 0            AD      L
 0970                        10,2270  0 4762 0            TC      -1CHK
 0971                        10,2271  3 4746 0            CA      S-ZERO
 0972                        10,2272  22 000 1  DV6-+     LXCH    A
 0973                        10,2273  4 0000 0            CS      A
 0974                        10,2274  0 0006 1            EXTEND
 0975                        10,2275  11'042 1            DV      KEEP7
 0976                        10,2276  4 0000 0            CS      A
 0977                        10,2277  6 0001 0            AD      L
 0978                        10,2300  0 4761 0            TC      -1CHK -1
 0979                        10,2301  3 4746 0            CA      S-ZERO
 0980                        10,2302  22 000 1  DV6--     LXCH    A
 0981                        10,2303  0 0006 1            EXTEND
 0982                        10,2304  11'041 1            DV      KEEP6
 0983                        10,2305  6 0001 0            AD      L
 0984                        10,2306  0 4761 0            TC      -1CHK -1
 0985                        10,2307  4 0001 1            CS      L
 0986                        10,2310  6 1041 0            AD      KEEP6
 0987                        10,2311  0 4754 0            TC      -0CHK
R0988  DIVIDE SAME (ZERO).  THE RESULT SHOULD BE MAXIMUM AND THE REMAINDER
R0989  SHOULD BE THE SAME VALUE AS THE DIVISOR WITH THE SAME SIGN AS THE
R0990  DIVIDEND.
 0991                        10,2312  4 4711 0  DV7++     CS      S+ZERO
 0992                        10,2313  55'041 1            TS      KEEP6             -0
 0993                        10,2314  4 0000 0            CS      A
 0994                        10,2315  55'042 1            TS      KEEP7             +0
 0995                        10,2316  54 001 1            TS      L
 0996                        10,2317  0 0006 1            EXTEND
 0997                        10,2320  11'042 1            DV      KEEP7
 0998                        10,2321  6 4726 0            AD      S-MAX
 0999                        10,2322  0 4754 0            TC      -0CHK
 1000                        10,2323  22 000 1  DV7+-     LXCH    A                 C(A) = C(L) = +0
 1001                        10,2324  0 0006 1            EXTEND
 1002                        10,2325  11'041 1            DV      KEEP6
 1003                        10,2326  6 4725 0            AD      S+MAX
 1004                        10,2327  0 4754 0            TC      -0CHK
 1005                        10,2330  4 0000 0            CS      A
 1006                        10,2331  22 000 1  DV7-+     LXCH    A
 1007                        10,2332  4 0000 0            CS      A                 C(A) = C(L) = -0
 1008                        10,2333  0 0006 1            EXTEND
 1009                        10,2334  11'042 1            DV      KEEP7
 1010                        10,2335  6 4725 0            AD      S+MAX
 1011                        10,2336  0 4754 0            TC      -0CHK
 1012                        10,2337  4 0000 0            CS      A
 1013                        10,2340  22 000 1  DV7--     LXCH    A                 C(A) = C(L) = -0
 1014                        10,2341  0 0006 1            EXTEND
 1015                        10,2342  11'041 1            DV      KEEP6
 1016                        10,2343  6 4726 0            AD      S-MAX
 1017                        10,2344  0 4754 0            TC      -0CHK
 1018                10,2345  4 0001 1             CS      L
 1019                10,2346  0 4753 1             TC      -0CHK -1

R1020  DEVIDE SAME (ZERO). THE CONTENTS OF THE A REGISTER AND L REGISTER WILL
R1021  HAVE OPPOSITE SIGNS BEFORE DEVISION. THE SIGN OF THE QUOTIENT WILL
R1022  DEPEND ON THE SIGN OF THE L REGISTER BEFORE DEVISION AND THE SIGN OF
R1023  THE DEVISOR. THE SIGN OF THE REMAINDER IS THE SAME SIGN AS THE SIGN OF
R1024  THE L REGISTER BEFORE DEVISION. C(L)  REMAINS SAME
 1025                10,2347  3 4711 1 DV8++     CA      S+ZERO
 1026                10,2350  55'042 1           TS      KEEP7           +0
 1027                10,2351  54 001 1           TS      L
 1028                10,2352  4 0000 0           CS      A
 1029                10,2353  55'041 1           TS      KEEP6           -0
 1030                10,2354  0 0006 1           EXTEND                  A = -0, L = +0
 1031                10,2355  11'042 1           DV      KEEP7           A = L = +0
 1032                10,2356  55'034 0           TS      KEEP1
 1033                10,2357  3 0001 0           CA      L               C(A) = C(L) = +0
 1034                10,2360  0 4753 1           TC      -0CHK -1
 1035                10,2361  4 0000 0 DV8+-     CS      A
 1036                10,2362  0 0006 1           EXTEND                  A = -0, L = +0
 1037                10,2363  11'041 1           DV      KEEP6           A = -0, L = +0
 1038                10,2364  6 1034 1           AD      KEEP1
 1039                10,2365  0 4754 0           TC      -0CHK
 1040                10,2366  4 0000 0           CS      A
 1041                10,2367  56 001 0           XCH     L               PUT -0 IN L
 1042                10,2370  0 4753 1           TC      -0CHK -1        CHECK C(L)
 1043                10,2371  0 0006 1 DV8-+     EXTEND                  A = +0, L = -0
 1044                10,2372  11'042 1           DV      KEEP7           A = L = -0
 1045                10,2373  55'035 1           TS      KEEP2
 1046                10,2374  6 1034 1           AD      KEEP1
 1047                10,2375  0 4754 0           TC      -0CHK
 1048                10,2376  4 0000 0           CS      A
 1049                10,2377  56 001 0           XCH     L               PUT -0 IN L
 1050                10,2400  0 4754 0           TC      -0CHK           CHECK C(L)
 1051                10,2401  0 0006 1 DV8--     EXTEND                  A = +0, L = -0
 1052                10,2402  11'041 1           DV      KEEP6           A = +0, L = -0
 1053                10,2403  6 1035 0           AD      KEEP2
 1054                10,2404  0 4754 0           TC      -0CHK
 1055                10,2405  3 4725 0           CA      S+MAX           CHECK QUOTIENT IS CORRECT
 1056                10,2406  6 1035 0           AD      KEEP2
 1057                10,2407  0 4754 0           TC      -0CHK
 1058                10,2410  56 001 0           XCH     L
 1059                10,2411  0 4754 0           TC      -0CHK           CHECK C(L)

R1060  INPUT-OUTPUT INSTRUCTIONS
R1061  NORMAL USE OF READ AND WRITE
 1062                10,2412  3 4745 0 IN-OUT1   CA      S-1
 1063                10,2413  0 0006 1           EXTEND
 1064                10,2414  01 001 1           WRITE   L                77776
 1065                10,2415  4 0000 0           CS      A                00001
 1066                     10,2416  0 0006 1           EXTEND
 1067                     10,2417  00 001 0           READ     L                77776
 1068                     10,2420  0 4762 0           TC       -1CHK
 1069                     10,2421  3 4726 0           CA       S-MAX
 1070                     10,2422  6 4726 0           AD       S-MAX            C(A) = 10 - 00001
 1071                     10,2423  0 0006 1           EXTEND
 1072                     10,2424  01 002 1           WRITE    Q
 1073                     10,2425  4 0000 0           CS       A               01 - 37776
 1074                     10,2426  0 0006 1           EXTEND
 1075                     10,2427  00 002 0           READ     Q                10 - 00001
 1076                     10,2430  55,034 0           TS       KEEP1
 1077                     10,2431  0 4770 0           TC       ERRORS
 1078                     10,2432  3 1034 1           CA       KEEP1
 1079                     10,2433  6 4725 0           AD       S+MAX
 1080                     10,2434  0 4761 0           TC       -1CHK -1

R1081  NORMAL USE OF RAND, RAND = READ AND MASK
 1082                     10,2435  3 4711 1  RANDCHK  CA       S+ZERO
 1083                     10,2436  54 001 1           TS       L
 1084                     10,2437  0 0006 1           EXTEND
 1085                     10,2440  02 001 1           RAND     L               00000, 00000
 1086                     10,2441  0 4753 1           TC       -0CHK -1
 1087                     10,2442  3 4746 0           CA       S-ZERO
 1088                     10,2443  0 0006 1           EXTEND
 1089                     10,2444  02 001 1           RAND     L                77777, 00000
 1090                     10,2445  0 4753 1           TC       -0CHK -1
 1091                     10,2446  4 0000 0           CS       A
 1092                     10,2447  54 001 1           TS       L
 1093                     10,2450  4 0000 0           CS       A
 1094                     10,2451  0 0006 1           EXTEND
 1095                     10,2452  02 001 1           RAND     L               00000, 77777
 1096                     10,2453  0 4753 1           TC       -0CHK -1
 1097                     10,2454  3 4746 0           CA       S-ZERO
 1098                     10,2455  0 0006 1           EXTEND
 1099                     10,2456  02 001 1           RAND     L               77777, 77777
 1100                     10,2457  0 4754 0           TC       -0CHK
 1101                     10,2460  3 4725 0  RANDOV   CA        S+MAX
 1102                     10,2461  6 4713 0           AD       S+2              01 - 00001
 1103                     10,2462  56 002 0           XCH      Q
 1104                     10,2463  3 4746 0           CA       S-ZERO           77777
 1105                     10,2464  0 0006 1           EXTEND
 1106                     10,2465  02 002 1           RAND     Q                01 - 00001
 1107                     10,2466  55,034 0           TS       KEEP1
 1108                     10,2467  0 4770 0           TC       ERRORS
 1109                     10,2470  0 4761 0           TC       -1CHK -1
 1110                     10,2471  4 1034 0           CS       KEEP1
 1111                     10,2472  0 4762 0           TC       -1CHK

R1112  NORMAL USE OF WAND, WAND = WRITE AND MASK
 1113                     10,2473  3 4711 1  WANDCHK  CA       S+ZERO
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INS    AGC BLK2 INSTRUCTION CHECK                                                      USER'S OWN PAGE NO. 25

 1114                        10,2474  54 001 1              TS      L
 1115                        10,2475  0 0006 1              EXTEND
 1116                        10,2476  03 001 0              WAND    L                     00000, 00000
 1117                        10,2477  6 0001 0              AD      L
 1118                        10,2500  0 4753 1              TC      -0CHK -1
 1119                        10,2501  3 4746 0              CA      S-ZERO
 1120                        10,2502  0 0006 1              EXTEND
 1121                        10,2503  03 001 0              WAND    L                     77777, 00000
 1122                        10,2504  6 0001 0              AD      L
 1123                        10,2505  0 4753 1              TC      -0CHK -1
 1124                        10,2506  4 0000 0              CS      A
 1125                        10,2507  54 001 1              TS      L
 1126                        10,2510  4 0000 0              CS      A
 1127                        10,2511  0 0006 1              EXTEND
 1128                        10,2512  03 001 0              WAND    L                     00000, 77777
 1129                        10,2513  6 0001 0              AD      L
 1130                        10,2514  0 4753 1              TC      -0CHK -1
 1131                        10,2515  3 4746 0              CA      S-ZERO
 1132                        10,2516  54 001 1              TS      L
 1133                        10,2517  0 0006 1              EXTEND
 1134                        10,2520  03 001 0              WAND    L                     77777, 77777
 1135                        10,2521  6 0001 0              AD      L
 1136                        10,2522  0 4754 0              TC      -0CHK
 1137                        10,2523  3 4725 0   WANDUF     CA      S+MAX
 1138                        10,2524  6 4713 0              AD      S+2                   01 - 00001
 1139                        10,2525  56 002 0              XCH     Q
 1140                        10,2526  3 4746 0              CA      S-ZERO                77777
 1141                        10,2527  0 0006 1              EXTEND
 1142                        10,2530  03 002 0              WAND    Q
 1143                        10,2531  55,035 1              TS      KEEP2
 1144                        10,2532  0 4770 0              TC      ERRORS
 1145                        10,2533  3 0002 0              CA      Q
 1146                        10,2534  55,034 0              TS      KEEP1
 1147                        10,2535  0 4770 0              TC      ERRORS
 1148                        10,2536  4 1034 0              CS      KEEP1
 1149                        10,2537  0 4762 0              TC      -1CHK
 1150                        10,2540  4 1035 1              CS      KEEP2
 1151                        10,2541  0 4762 0              TC      -1CHK

R1152  NORMAL USE OF ROR, READ AND SUPERIMPOSE
 1153                        10,2542  3 4711 1   RORCHK     CA      S+ZERO
 1154                        10,2543  54 001 1              TS      L
 1155                        10,2544  0 0006 1              EXTEND
 1156                        10,2545  04 001 1              ROR     L                     00000, 00000
 1157                        10,2546  0 4753 1              TC      -0CHK -1
 1158                        10,2547  3 0001 0              CA      L
 1159                        10,2550  0 4753 1              TC      -0CHK -1
 1160                        10,2551  3 4746 0              CA      S-ZERO
 1161                        10,2552  0 0006 1              EXTEND
 1162                        10,2553  04 001 1              ROR     L                     77777, 00000
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INS    AGC BLK2 INSTRUCTION CHECK                                                  USER'S OWN PAGE NO.  26

 1163                       10,2554  0 4754 0           TC      -0CHK
 1164                       10,2555  3 0001 0           CA      L
 1165                       10,2556  0 4753 1           TC      -0CHK -1
 1166                       10,2557  4 0000 0           CS      A
 1167                       10,2560  54 001 1           TS      L
 1168                       10,2561  4 0000 0           CS      A
 1169                       10,2562  0 0006 1           EXTEND
 1170                       10,2563  04 001 1           ROR     L                  00000, 77777
 1171                       10,2564  0 4754 0           TC      -0CHK
 1172                       10,2565  3 0001 0           CA      L
 1173                       10,2566  0 4754 0           TC      -0CHK
 1174                       10,2567  3 4746 0           CA      S-ZERO
 1175                       10,2570  0 0006 1           EXTEND
 1176                       10,2571  04 001 1           ROR     L                  77777, 77777
 1177                       10,2572  0 4754 0           TC      -0CHK
 1178                       10,2573  3 4726 0  ROROV    CA      S-MAX
 1179                       10,2574  6 4744 1           AD      S-2                10 - 37776
 1180                       10,2575  56 002 0           XCH     Q
 1181                       10,2576  3 4725 0           CA      S+MAX
 1182                       10,2577  6 4712 1           AD      S+1                01 - 00000
 1183                       10,2600  0 0006 1           EXTEND
 1184                       10,2601  04 002 1           ROR     Q                  11 - 37776
 1185                       10,2602  55,034 0           TS      KEEP1
 1186                       10,2603  0 2605 0           TC      +2
 1187                       10,2604  0 4770 0           TC      ERRORS
 1188                       10,2605  3 1034 1           CA      KEEP1
 1189                       10,2606  0 4762 0           TC      -1CHK

R1190  NORMAL USE OF WOR, WOR = WRITE AND SUPERIMPOSE
 1191                       10,2607  3 4711 1  WORCHK   CA      S+ZERO
 1192                       10,2610  54 001 1           TS      L
 1193                       10,2611  0 0006 1           EXTEND
 1194                       10,2612  05 001 0           WOR     L                  00000, 00000
 1195                       10,2613  0 4753 1           TC      -0CHK -1
 1196                       10,2614  3 0001 0           CA      L
 1197                       10,2615  0 4753 1           TC      -0CHK -1
 1198                       10,2616  3 4746 0           CA      S-ZERO
 1199                       10,2617  0 0006 1           EXTEND
 1200                       10,2620  05 001 0           WOR     L                  77777, 00000
 1201                       10,2621  0 4754 0           TC      -0CHK
 1202                       10,2622  3 0001 0           CA      L
 1203                       10,2623  0 4754 0           TC      -0CHK
 1204                       10,2624  4 0000 0           CS      A
 1205                       10,2625  54 001 1           TS      L
 1206                       10,2626  4 0000 0           CS      A
 1207                       10,2627  0 0006 1           EXTEND
 1208                       10,2630  05 001 0           WOR     L                  00000, 77777
 1209                       10,2631  0 4754 0           TC      -0CHK
 1210                       10,2632  3 0001 0           CA      L
 1211                       10,2633  0 4754 0           TC      -0CHK
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INS     AGC BLK2 INSTRUCTION CHECK                                                USER'S OWN PAGE NO.  27

 1212                         10,2634  3 4726 0           CA      S-MAX
 1213                         10,2635  0 0006 1           EXTEND
 1214                         10,2636  05 001 0           WOR     L                 77777, 77777
 1215                         10,2637  0 4754 0           TC      -0CHK
 1216                         10,2640  3 0001 0           CA      L
 1217                         10,2641  0 4754 0           TC      -0CHK
 1218                         10,2642  3 4726 0 WOROV     CA      S-MAX
 1219                         10,2643  6 4744 1           AD      S-2               10 - 37776
 1220                         10,2644  56 002 0           XCH     Q
 1221                         10,2645  3 4725 0           CA      S+MAX
 1222                         10,2646  6 4712 1           AD      S+1               01 - 00000
 1223                         10,2647  0 0006 1           EXTEND
 1224                         10,2650  05 002 0           WOR     Q                 11 - 37776
 1225                         10,2651  55'035 1           TS      KEEP2             SHOULD NOT SKIP
 1226                         10,2652  1 2654 0           TCF     +2
 1227                         10,2653  0 4770 0           TC      ERRORS
 1228                         10,2654  56 002 0           XCH     Q
 1229                         10,2655  55'036 1           TS      KEEP3
 1230                         10,2656  0 2660 0           TC      +2
 1231                         10,2657  0 4770 0           TC      ERRORS
 1232                         10,2660  3 1036 0           CA      KEEP3             CHECK C(Q)
 1233                         10,2661  0 4762 0           TC      -1CHK
 1234                         10,2662  3 1035 0           CA      KEEP2
 1235                         10,2663  0 4762 0           TC      -1CHK             CHECK C(A)

R1236   NORMAL USE OF RXOR
 1237                         10,2664  3 4711 1 RXORCHK   CA      S+ZERO
 1238                         10,2665  54 001 1           TS      L
 1239                         10,2666  0 0006 1           EXTEND
 1240                         10,2667  06 001 0           RXOR    L                 00000, 00000
 1241                         10,2670  0 4753 1           TC      -0CHK -1
 1242                         10,2671  3 4746 0           CA      S-ZERO
 1243                         10,2672  0 0006 1           EXTEND
 1244                         10,2673  06 001 0           RXOR    L                 77777, 00000
 1245                         10,2674  0 4754 0           TC      -0CHK
 1246                         10,2675  3 0001 0           CA      L
 1247                         10,2676  0 4753 1           TC      -0CHK -1
 1248                         10,2677  4 0000 0           CS      A
 1249                         10,2700  54 001 1           TS      L
 1250                         10,2701  4 0000 0           CS      A
 1251                         10,2702  0 0006 1           EXTEND
 1252                         10,2703  06 001 0           RXOR    L                 00000, 77777
 1253                         10,2704  0 4754 0           TC      -0CHK
 1254                         10,2705  3 4746 0           CA      S-ZERO
 1255                         10,2706  0 0006 1           EXTEND
 1256                         10,2707  06 001 0           RXOR    L                 77777, 77777
 1257                         10,2710  0 4753 1           TC      -0CHK -1
 1258                         10,2711  3 0001 0           CA      L
 1259                         10,2712  0 4754 0           TC      -0CHK
 1260                         10,2713  4 0000 0           CS      A
 1261                          10,2714  54 002 1            TS       Q
 1262                          10,2715  3 4725 0  RXORUV    CA       S+MAX
 1263                          10,2716  6 4713 0            AD       S+2            01 - 00001
 1264                          10,2717  0 0006 1            EXTEND
 1265                          10,2720  06 002 0            RXOR     Q              10 - 37776, C(Q) = -0
 1266                          10,2721  55,034 0            TS       KEEP1
 1267                          10,2722  0 4770 0            TC       ERRORS
 1268                          10,2723  3 1034 1            CA       KEEP1
 12681                         10,2724  0 4762 0            TC       -1CHK

 1269                          10,2725  0 4224 1            TC       CHECKNJ        CHECK FOR NEW JOB
 12691                         10,2726  0 2732 0            TC       XTRANDX

R1270   NEXT THREE CONSTANTS ARE ADDRESSESS USED BY EXTRACODE INSTRUCTIONS
 1271                          10,2727   02740 0  ADRSBZMF  ADRES    NDXBZMF
 1272                          10,2730   02744 1  ADRSDCA   ADRES    NDXDCA
 1273                          10,2731   03033 1  ADRSQXCH  ADRES    NDXAUG

R1274   NORMAL USE OF INDEX WITH EXTRACODE INSTRUCTIONS
R1275   INDEX INSTRUCTION USED WITH INDEX AND BZF
 1276                          10,2732  3 4711 1  XTRANDX   CA       S+ZERO
 1277                          10,2733  0 0006 1            EXTEND
 1278                          10,2734  5 4711 1            NDX      S+ZERO
 1279                          10,2735  5 2727 1            NDX      ADRSBZMF
 1280                          10,2736  1 0000 0            BZF      00000          BZF +2
 1281                          10,2737  0 4770 0            TC       ERRORS
R1282   INDEX INSTRUCTION USED WITH BZMF
 1283                          10,2740  0 0006 1  NDXBZMF   EXTEND
 1284                          10,2741  5 2730 1            NDX      ADRSDCA
 1285                          10,2742  6 0000 1            BZMF     0000           BZMF+2
 1286                          10,2743  0 4770 0            TC       ERRORS
R1287   INDEX INSTRUCTION USED WITH DCA
 1288                          10,2744  0 0006 1  NDXDCA    EXTEND
 1289                          10,2745  5 4751 0            INDEX    ADRS+1         DCA S+1
 1290                          10,2746  3 0001 0            DCA      0000           C(A) = +1, C(L) = +2
 1291                          10,2747  4 0000 0            CS       A
 1292                          10,2750  6 0001 0            AD       L
 1293                          10,2751  0 4761 0            TC       -1CHK -1
R1294   INDEX INSTRUCTION USED WITH DCS
 1295                          10,2752  0 0006 1            EXTEND
 1296                          10,2753  5 4751 0            INDEX    ADRS+1         DCS S+1
 1297                          10,2754  4 0001 1            DCS      0000           C(A) = -1, C(L) = -2
 1298                          10,2755  4 0000 0            CS       A
 1299                          10,2756  6 0001 0            AD       L
 1300                          10,2757  0 4762 0            TC       -1CHK
R1301   INDEX INSTRUCTION USED WITH MP AND SU
 1302                          10,2760  3 4725 0            CA       S+MAX          37777
 1303                          10,2761  0 0006 1            EXTEND
 1304                          10,2762  5 4751 0            NDX      ADRS+1
 1305                          10,2763  7 0001 1            MP       0001           C(A) = 1, C(L) = 37776
 1306                     10,2764  0 4761 0                 TC      -1CHK -1
 1307                     10,2765  3 4725 0                 CA      S+MAX           37777
 1308                     10,2766  0 0006 1                 EXTEND
 1309                     10,2767  5 4712 1                 NDX     S+1
 1310                     10,2770  60 000 1                 SU      0000
 1311                     10,2771  0 4761 0                 TC      -1CHK -1
R1312  INDEX INSTRUCTION USED WITH DV
 1313                     10,2772  3 4747 1  NDXDV          CA      DV1CON          PUT 14000 (3/8) IN KEEP3
 1314                     10,2773  55'036 1                 TS      KEEP3
 1315                     10,2774  3 4711 1                 CA      S+ZERO
 1316                     10,2775  54 001 1                 TS      L
 1317                     10,2776  3 4706 1                 CA      SBIT13          10000
 1318                     10,2777  0 0006 1                 EXTEND
 1319                     10,3000  5 4665 0                 NDX     ADRS3
 1320                     10,3001  10 000 0                 DV      0000            C(A) = 25252, C(L) = 10000
 1321                     10,3002  55'034 0                 TS      KEEP1
 1322                     10,3003  3 4746 0                 CA      S-ZERO
 1323                     10,3004  56 001 0                 XCH     L
 1324                     10,3005  4 0000 0                 CS      A
 1325                     10,3006  0 0006 1                 EXTEND
 1326                     10,3007  5 4665 0                 NDX     ADRS3
 1327                     10,3010  10 000 0                 DV      0000
 1328                     10,3011  6 1034 1                 AD      KEEP1
 1329                     10,3012  0 4754 0                 TC      -0CHK
R1330  INDEX USED WITH MSU (C(A) = +0, C(K) = -0) (RESULT = -1)
 1331                     10,3013  3 4711 1  NDXMSU         CA      S+ZERO
 1332                     10,3014  55'034 0                 TS      KEEP1
 1333                     10,3015  4 0000 0                 CS      A
 1334                     10,3016  0 0006 1                 EXTEND
 1335                     10,3017  5 4663 0                 NDX     ADRS1           MSU KEEP1
 1336                     10,3020  20 000 0                 MSU     0000            C(A) = -1
 1337                     10,3021  0 4762 0                 TC      -1CHK
R1338  INDEX USED WITH QXCH
 1339                     10,3022  3 2731 0  NDXQXCH        CA      ADRSQXCH
 1340                     10,3023  55'034 0                 TS      KEEP1
 1341                     10,3024  0 3026 0                 TC      +2
 1342                     10,3025  0 4770 0                 TC      ERRORS
 1343                     10,3026  0 0006 1                 EXTEND
 1344                     10,3027  5 4663 0                 NDX     ADRS1           QXCH KEEP1
 1345                     10,3030  22 000 1                 QXCH    0000
 1346                     10,3031  0 0002 0                 TC      Q
 1347                     10,3032  0 4770 0                 TC      ERRORS
R1348  INDEX USED WITH AUG
 1349                     10,3033  4 4711 0  NDXAUG         CS      S+ZERO
 1350                     10,3034  55'034 0                 TS      KEEP1           00000
 1351                     10,3035  0 0006 1                 EXTEND
 1352                     10,3036  5 4663 0                 NDX     ADRS1           AUG KEEP1
 1353                     10,3037  24 000 1                 AUG     0000
 1354                     10,3040  3 1034 1                 CA      KEEP1
 1355                     10,3041  0 4762 0                 TC      -1CHK
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R1356  INDEX USED WITH DIM
 1357                    10,3042  3 4713 0  NDXDIM    CA      S+2
 1358                    10,3043  55'034 0            TS      KEEP1
 1359                    10,3044  0 0006 1            EXTEND
 1360                    10,3045  5 4663 0            NDX     ADRS1                 DIM KEEP1
 1361                    10,3046  26 000 0            DIM     0000
 1362                    10,3047  4 1034 0            CS      KEEP1
 1363                    10,3050  0 4762 0            TC      -1CHK

R1364  NORMAL USE OF INDEX WITH IN-OUT INSTRUCTIONS
R1365  INDEX USED WITH WRITE AND READ
 1366                    10,3051  3 4745 0  NDXINOUT  CA      S-1
 1367                    10,3052  0 0006 1            EXTEND
 1368                    10,3053  5 4712 1            NDX     S+1                   WRITE L
 1369                    10,3054  01 000 0            WRITE   0000
 1370                    10,3055  4 0000 0            CS      A
 1371                    10,3056  0 0006 1            EXTEND
 1372                    10,3057  5 4712 1            NDX     S+1                   READ L
 1373                    10,3060  00 000 1            READ    0000
 1374                    10,3061  0 4762 0            TC      -1CHK
R1375  INDEX USED WITH RAND
 1376                    10,3062  3 4712 1            CA      S+1                   00001
 1377                    10,3063  54 001 1            TS      L
 1378                    10,3064  3 4746 0            CA      S-ZERO                77777
 1379                    10,3065  0 0006 1            EXTEND
 1380                    10,3066  5 4712 1            NDX     S+1                   RAND L
 1381                    10,3067  02 000 0            RAND    00000
 1382                    10,3070  0 4761 0            TC      -1CHK -1
R1383  INDEX USED WITH WAND
 1384                    10,3071  3 4726 0            CA      S-MAX                 40000
 1385                    10,3072  6 4712 1            AD      S+1                   40001
 1386                    10,3073  54 001 1            TS      L
 1387                    10,3074  3 4725 0            CA      S+MAX                 37777
 1388                    10,3075  0 0006 1            EXTEND
 1389                    10,3076  5 4712 1            NDX     S+1                   WAND L
 1390                    10,3077  03 000 1            WAND    0000                  C(A) = C(L) = +1
 1391                    10,3100  0 4761 0            TC      -1CHK -1
 1392                    10,3101  4 0001 1            CS      L
 1393                    10,3102  0 4762 0            TC      -1CHK
R1394  INDEX USED WITH ROR
 1395                    10,3103  3 4712 1            CA      S+1
 1396                    10,3104  54 002 1            TS      Q
 1397                    10,3105  3 4711 1            CA      S+ZERO
 1398                    10,3106  0 0006 1            EXTEND
 1399                    10,3107  5 4713 0            NDX     S+2                   ROR Q
 1400                    10,3110  04 000 0            ROR     0000
 1401                    10,3111  0 4761 0            TC      -1CHK -1
R1402  INDEX USED WITH WOR
 1403                    10,3112  3 4737 0            CA      S-7
 1404                    10,3113  54 001 1            TS      L                     77770
 1405                      10,3114  3 4725 0             CA      S+MAX
 1406                      10,3115  6 4745 0             AD      S-1             37776
 1407                      10,3116  0 0006 1             EXTEND
 1408                      10,3117  5 4712 1             NDX     S+1             WOR L
 1409                      10,3120  05 000 1             WOR     0000            C(A) = C(L) = -1
 1410                      10,3121  0 4762 0             TC      -1CHK
 1411                      10,3122  3 0001 0             CA      L
 1412                      10,3123  0 4762 0             TC      -1CHK
R1413   INDEX USED WITH RXOR
 1414                      10,3124  3 4745 0             CA      S-1
 1415                      10,3125  54 001 1             TS      L               77776
 1416                      10,3126  3 4725 0             CA      S+MAX           37777
 1417                      10,3127  0 0006 1             EXTEND
 1418                      10,3130  5 4712 1             NDX     S+1             RXOR L
 1419                      10,3131  06 000 1             RXOR    0000            C(A) = 40001
 1420                      10,3132  6 4725 0             AD      S+MAX
 1421                      10,3133  0 4761 0             TC      -1CHK -1
R14211  CHECKS EXTRACODE INDEX OF AN SC REGISTER
 14212                     10,3134  3 4713 0             CA      S+2
 14213                     10,3135  55'034 0             TS      KEEP1
 14214                     10,3136  3 4663 0             CA      ADRS1           ADDRESS OF KEEP1
 14215                     10,3137  54 001 1             TS      L
 14216                     10,3140  3 4712 1             CA      S+1
 14217                     10,3141  0 0006 1             EXTEND
 14218                     10,3142  5 0001 0             NDX     L
 142181                    10,3143  60 000 1             SU      0000
 14219                     10,3144  0 4762 0             TC      -1CHK

R1422   CHECK OF SPECIAL AND CENTRAL REGISTERS
R1423   CHANGE OF SIGN BY ADDING SAME NUMBER (ADDER)
 1424                      10,3145  3 4707 0  ADDCHK     CA      SBIT14          20000
 1425                      10,3146  6 0000 1             AD      A               01 -00000
 1426                      10,3147  54 000 0             TS      A
 1427                      10,3150  0 4770 0             TC      ERRORS
 1428                      10,3151  6 0000 1             AD      A               10 - 00000
 1429                      10,3152  54 000 0             TS      A
 1430                      10,3153  0 4770 0             TC      ERRORS
 1431                      10,3154  6 0000 1             AD      A               00001
 1432                      10,3155  54 000 0             TS      A
 1433                      10,3156  0 3160 0             TC      +2
 1434                      10,3157  0 4770 0             TC      ERRORS
 1435                      10,3160  0 4761 0             TC      -1CHK -1

R1436   NORMAL OPERATION OF CYCLE RIGHT REGISTER
 1437                      10,3161  3 4733 1  CYRCHK     CA      CYRCON          57761
 1438                      10,3162  55'040 0             TS      KEEP5           COUNTDOWN REGISTER
 1439                      10,3163  3 4726 0             CA      S-MAX           40000
 1440                      10,3164  54 020 1             TS      CYR
 1441                      10,3165  10 020 1  CYRLOOP    CCS     CYR
 1442                      10,3166  0 3172 0             TC      CYRCNTDN
 1443                          10,3167  0 4770 0             TC     ERRORS
 1444                          10,3170  0 3174 0             TC     ENDCYR
 1445                          10,3171  0 4770 0             TC     ERRORS
 1446                          10,3172  25,040 1  CYRCNTDN   INCR   KEEP5
 1447                          10,3173  0 3165 0             TC     CYRLOOP
 1448                          10,3174  3 1040 1  ENDCYR     CA     KEEP5                     57777
 1449                          10,3175  6 0020 0             AD     CYR                       C(CYR) = 20000
 1450                          10,3176  10 000 0             CCS    A                         -0 = END OF CYCLE RIGHT CHECK
 1451                          10,3177  0 4770 0             TC     ERRORS
 1452                          10,3200  0 4770 0             TC     ERRORS
 1453                          10,3201  0 4770 0             TC     ERRORS

R1454   NORMAL OPERATION OF CYCLE LEFT REGISTER
 1455                          10,3202  3 4735 1  CYLCHK     CA     S-15                      77760, -15
 1456                          10,3203  55,040 0             TS     KEEP5                     COUNT REGISTER
 1457                          10,3204  3 4726 0             CA     S-MAX                     40000
 1458                          10,3205  54 022 0             TS     CYL
 1459                          10,3206  10 022 0  CYLLOOP    CCS    CYL
 1460                          10,3207  0 3213 1             TC     CYLCNTDN
 1461                          10,3210  0 4770 0             TC     ERRORS
 1462                          10,3211  0 3215 1             TC     ENDCYL
 1463                          10,3212  0 4770 0             TC     ERRORS
 1464                          10,3213  25,040 1  CYLCNTDN   INCR   KEEP5
 1465                          10,3214  0 3206 0             TC     CYLLOOP
 1466                          10,3215  3 0022 1  ENDCYL     CA     CYL                       C(CYL) SHOULD = +1
 1467                          10,3216  0 4761 0             TC     -1CHK -1
 1468                          10,3217  3 1040 1             CA     KEEP5
 1469                          10,3220  0 4762 0             TC     -1CHK

R1470   NORMAL OPERATION OF SHIFT RIGHT REGISTER
 1471                          10,3221  3 4736 1  SRCHK      CA     S-14                      77761, -14
 1472                          10,3222  55,040 0             TS     KEEP5                     COUNT REGISTER
 1473                          10,3223  3 4726 0             CA     S-MAX                     40000
 1474                          10,3224  54 021 0             TS     SR
 1475                          10,3225  10 021 0  SRLOOP     CCS    SR
 1476                          10,3226  0 4770 0             TC     ERRORS
 1477                          10,3227  0 4770 0             TC     ERRORS
 1478                          10,3230  0 3234 1             TC     SRCNTDN
 1479                          10,3231  3 1040 1             CA     KEEP5                     HAS SHIFTED 14 TIMES
 1480                          10,3232  0 4762 0             TC     -1CHK
 1481                          10,3233  0 3236 0             TC     EDOPCHK                   NEXT SUBROUTINE
 1482                          10,3234  25,040 1  SRCNTDN    INCR   KEEP5                     INCREMENT COUNT REGISTER
 1483                          10,3235  0 3225 1             TC     SRLOOP

R1484   NORMAL OPERATION OF EDOP REGISTER.  BITS 8 - 14 OF G REGISTER GO TO
R1485   BITS 1 - 7 OF EDOP.
 1486                          10,3236  3 4735 1  EDOPCHK    CA     S-15                      77760, -15
 1487                          10,3237  55,040 0             TS     KEEP5                     COUNT REGISTER
 1488                          10,3240  3 4722 1             CA     S7BITS                    00177
 1489                          10,3241  54 022 0             TS     CYL
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1490                     10,3242  3 0022 1  EDOPLOOP CA      CYL
1491                     10,3243  54 023 1           TS      EDOP
1492                     10,3244  54 020 1           TS      CYR               SHIFT LEFT 7 TIMES
1493                     10,3245  3 0020 0           CA      CYR
1494                     10,3246  3 0020 0           CA      CYR
1495                     10,3247  3 0020 0           CA      CYR
1496                     10,3250  3 0020 0           CA      CYR
1497                     10,3251  3 0020 0           CA      CYR
1498                     10,3252  3 0020 0           CA      CYR
1499                     10,3253  3 0020 0           CA      CYR
1500                     10,3254  7 4722 0           MASK    S7BITS
1501                     10,3255  4 0000 0           CS      A
1502                     10,3256  55'034 0           TS      KEEP1             COMPLEMEMT OF C(EDOP)
1503                     10,3257  3 4746 0           CA      S-ZERO
1504                     10,3260  7 0023 1           MASK    EDOP
1505                     10,3261  6 1034 1           AD      KEEP1
1506                     10,3262  0 4754 0           TC      -0CHK
1507                     10,3263  25'040 1           INCR    KEEP5             INCREMEMT COUNT REGISTER
1508                     10,3264  10 023 1           CCS     EDOP
1509                     10,3265  0 3242 0           TC      EDOPLOOP
1510                     10,3266  0 3271 0           TC      ENDEDOP
1511                     10,3267  0 4770 0           TC      ERRORS
1512                     10,3270  0 4770 0           TC      ERRORS
1513                     10,3271  3 1040 1  ENDEDOP  CA      KEEP5             SHOULD HAVE PERFORMED EDOPLOOP 14 TIMES
1514                     10,3272  0 4762 0           TC      -1CHK

1515                     10,3273  25'046 1           INCR    SCOUNT            INCREMENT UPON SUCCESSFUL COMLETION

1516                     10,3274  0 5010 0           TC      SMODECHK

 END OF REVISION 0 OF PROGRAM RETRED44 BY NASA 2021100                        LAST ASSEMBLED ON JUL 6, 1965
 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                                      PAGE

10MSRUPT        7626     DEFINED BY EQUALS                                                          130
110MRUPT     01,3071     NORMALLY DEFINED                                                           128
11DSPIN      04,3241     NORMALLY DEFINED                                                           180
120MRUPT     01,3070     NORMALLY DEFINED                                                           128
15BITADR        6172     NORMALLY DEFINED                                                            23


20BIAS       04,2617     NORMALLY DEFINED                                                           162
21/22REG        0101     DEFINED BY EQUALS                                                            7

2BLANK       04,2517     NORMALLY DEFINED                                                           148

2K              7634     DEFINED BY EQUALS                                                           58
2K+3            4600     NORMALLY DEFINED                                                           205
2RNDEND      04,3052     NORMALLY DEFINED                                                           173
2ROUND       04,3042     NORMALLY DEFINED                                                           172


5B10         01,2116     NORMALLY DEFINED                                                           101
5BLANK1      04,2475     NORMALLY DEFINED                                                           147
5BLANK       04,2454     NORMALLY DEFINED                                                           147


89TEST       04,2053     NORMALLY DEFINED                                                           141


+DECSGN      04,2164     NORMALLY DEFINED                                                           142
+DOWN        00,2532     NORMALLY DEFINED                                                            76

+ON          04,2273     NORMALLY DEFINED                                                           144


A               0000     DEFINED BY EQUALS                                                            5

ABCLOAD      05,2535     NORMALLY DEFINED                                                           165
ABLOAD       05,2572     NORMALLY DEFINED                                                           165
ABORT           4662     NORMALLY DEFINED                                                           207
ABS          00,3144     NORMALLY DEFINED                                                            87
ABVAL        00,3117     NORMALLY DEFINED                                                            87
ABVALABS     00,3114     NORMALLY DEFINED                                                            87
ACCEPTUP     01,3253     NORMALLY DEFINED                                                           132
ACCEPTWD     05,2024     NORMALLY DEFINED                                                           149
ACOS3        00,3564     NORMALLY DEFINED                                                            96
ACOS=0       00,3551     NORMALLY DEFINED                                                            95
ACOSABRT     00,3637     NORMALLY DEFINED                                                            97
ACOSOVF      00,3633     NORMALLY DEFINED                                                            97
ACOSSHR      00,3626     NORMALLY DEFINED                                                            97
ACOSST2      00,3554     NORMALLY DEFINED                                                            95
ACOSST       00,3537     NORMALLY DEFINED                                                            95
ACOSZERO     00,3640     NORMALLY DEFINED                                                            97
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                          PAGE

ADDCHK       10,3145     NORMALLY DEFINED                                               240
ADDRESS         6036     NORMALLY DEFINED                                                19
ADDRWD          0102     NORMALLY DEFINED                                                 7
ADIAX           0744     NORMALLY DEFINED                                                11
ADRS1           4663     NORMALLY DEFINED                                               210
ADRS2           4664     NORMALLY DEFINED                                               210
ADRS3           4665     NORMALLY DEFINED                                               210
ADRS4           4666     NORMALLY DEFINED                                               210
ADRS5           4667     NORMALLY DEFINED                                               210
ADRS6           4670     NORMALLY DEFINED                                               210
ADRS7           4671     NORMALLY DEFINED                                               210
ADRS+1          4751     NORMALLY DEFINED                                               211
ADRSBZMF     10,2727     NORMALLY DEFINED                                               237
ADRSDCA      10,2730     NORMALLY DEFINED                                               237
ADRSDV1         4752     NORMALLY DEFINED                                               211
ADRSQXCH     10,2731     NORMALLY DEFINED                                               237
ADSRAX          0747     NORMALLY DEFINED                                                11

ALARMCON        4727     NORMALLY DEFINED                                               210
ALLDC/OC     05,2676     NORMALLY DEFINED                                               167
ALOAD        05,2620     NORMALLY DEFINED                                               166
ALTM            0060     DEFINED BY EQUALS BUT NEVER REFERRED TO                          6
ARCCOS       00,3524     NORMALLY DEFINED                                                95
ARCSIN       00,3522     NORMALLY DEFINED                                                95
ARG+            7235     NORMALLY DEFINED                                                48
ARGHI        00,3334     NORMALLY DEFINED                                                91
ARGLO        00,3402     NORMALLY DEFINED                                                92
ARGZERO2        7252     NORMALLY DEFINED                                                48
ARGZERO         7255     NORMALLY DEFINED                                                48
ARTHINSF     04,2751     NORMALLY DEFINED                                               171
ARTOUTSF     04,2620     NORMALLY DEFINED                                               162
ARUPT           0010     DEFINED BY EQUALS                                                5

ASINEX       00,3621     NORMALLY DEFINED                                                96
AUGCHK       07,2573     NORMALLY DEFINED                                               221
AXC          01,2005     NORMALLY DEFINED                                                98
AXT          01,2000     NORMALLY DEFINED                                                98


B11T14          6233     NORMALLY DEFINED                                                24
B12-1        01,3312     NORMALLY DEFINED                                               133
B3TOB4       01,2215     NORMALLY DEFINED                                               104
B5TOB8       01,2105     NORMALLY DEFINED                                               100

BANKCALL        4063     NORMALLY DEFINED                                               105
BANKJUMP        4105     NORMALLY DEFINED                                               105
BANKMASK        6232     NORMALLY DEFINED                                                24
BANKRUPT        0016     DEFINED BY EQUALS                                                5
BANKSET         0151     NORMALLY DEFINED                                                 9
BBANK           0006     DEFINED BY EQUALS                                                5
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SYMBOL      DEFINITION   HEALTH OF DEFINITION                                     PAGE

BDDV             7520    NORMALLY DEFINED                                           55
BDSU             7034    NORMALLY DEFINED                                           42
BHIZ          01,2072    NORMALLY DEFINED                                          100
BIASCOM       04,2547    NORMALLY DEFINED                                          161
BIASHI        00,2510    NORMALLY DEFINED                                           74
BIASLO        00,2250    NORMALLY DEFINED                                           67
BINCON           4511    NORMALLY DEFINED                                          201
BINROUND      04,2761    NORMALLY DEFINED                                          171
BIT10            7635    NORMALLY DEFINED                                           58
BIT11            7634    NORMALLY DEFINED                                           58
BIT12            7633    NORMALLY DEFINED                                           58
BIT13            7632    NORMALLY DEFINED                                           58
BIT14            7631    NORMALLY DEFINED                                           58
BIT15            7630    NORMALLY DEFINED                                           58
BIT1             7646    NORMALLY DEFINED                                           58
BIT2             7645    NORMALLY DEFINED                                           58
BIT3             7644    NORMALLY DEFINED                                           58
BIT4             7643    NORMALLY DEFINED                                           58
BIT5             7642    NORMALLY DEFINED                                           58
BIT6             7641    NORMALLY DEFINED                                           58
BIT7             7640    NORMALLY DEFINED                                           58
BIT8             7637    NORMALLY DEFINED                                           58
BIT9             7636    NORMALLY DEFINED                                           58

BLANKCON      04,2532    NORMALLY DEFINED                                          148
BLANKRET         0100    DEFINED BY EQUALS BUT NEVER REFERRED TO                     7
BLOAD         05,2631    NORMALLY DEFINED                                          166
BMAGX            0042    DEFINED BY EQUALS BUT NEVER REFERRED TO                     5
BMAGY            0043    DEFINED BY EQUALS BUT NEVER REFERRED TO                     5
BMAGZ            0044    DEFINED BY EQUALS BUT NEVER REFERRED TO                     5
BOTHSGN       04,2257    NORMALLY DEFINED                                          144
BOV(B)        01,2077    NORMALLY DEFINED                                          100
BPL           01,2123    NORMALLY DEFINED                                          101
BPL/BMN       01,2114    NORMALLY DEFINED                                          101
BRANCH           6710    NORMALLY DEFINED                                           39
BRNCHCON      04,2516    NORMALLY DEFINED                                          148
BRUPT            0017    DEFINED BY EQUALS BUT NEVER REFERRED TO                     5

BUF2             0117    NORMALLY DEFINED                                            7
BUF              0114    NORMALLY DEFINED                                            7
BUF+          00,2366    NORMALLY DEFINED                                           70
BUF-          00,2362    NORMALLY DEFINED                                           70
BUFNORM       00,2444    NORMALLY DEFINED                                           73
BUMP          04,3303    NORMALLY DEFINED                                          183
BVSU             7010    NORMALLY DEFINED                                           42
BZE/GOTO      01,2107    NORMALLY DEFINED                                          101
BZFCHK        07,2752    NORMALLY DEFINED                                          223
BZMFCHK       07,2774    NORMALLY DEFINED                                          224
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 SYMBOL    DEFINITION   HEALTH OF DEFINITION                                                PAGE

CADRSTOR       0676     NORMALLY DEFINED                                                     10
CALL           6643     NORMALLY DEFINED                                                     37
CALLCODE       7657     NORMALLY DEFINED                                                     58
CALL/ITA    01,2127     NORMALLY DEFINED                                                    101
CCALL          6631     NORMALLY DEFINED                                                     37
CCSCHK      07,2011     NORMALLY DEFINED                                                    212
CDRVE       01,3074     NORMALLY DEFINED                                                    128
CDUX           0032     DEFINED BY EQUALS                                                     5
CDUXCMD        0050     DEFINED BY EQUALS BUT NEVER REFERRED TO                               5
CDUY           0033     DEFINED BY EQUALS BUT NEVER REFERRED TO                               5
CDUYCMD        0051     DEFINED BY EQUALS BUT NEVER REFERRED TO                               5
CDUZ           0034     DEFINED BY EQUALS                                                     5
CDUZCMD        0052     DEFINED BY EQUALS BUT NEVER REFERRED TO                               5
CGOTO          6671     NORMALLY DEFINED                                                     38
CHAN11C     01,3046     NORMALLY DEFINED                                                    127
CHAN13         0013     DEFINED BY EQUALS                                                    14
CHANDSP     05,2436     NORMALLY DEFINED                                                    159
CHANG1         4152     NORMALLY DEFINED                                                    107
CHANG2         4160     NORMALLY DEFINED                                                    107
CHANJOB     01,2316     NORMALLY DEFINED                                                    111
CHANLOAD    05,3044     NORMALLY DEFINED                                                    169
CHAR           0103     DEFINED BY EQUALS                                                     7
CHARALRM    04,3253     NORMALLY DEFINED                                                    181
CHARIN      04,2002     NORMALLY DEFINED                                                    140
CHECKNJ        4224     NORMALLY DEFINED                                                    117
CHRPRIO        4502     NORMALLY DEFINED                                                    201

CLEAR1      04,2441     NORMALLY DEFINED                                                    147
CLEAR       04,2407     NORMALLY DEFINED                                                    146
CLOAD       05,2646     NORMALLY DEFINED                                                    166
CLPASHI     04,2424     NORMALLY DEFINED                                                    146
CLPASS         0655     NORMALLY DEFINED                                                     10
CLR5        04,2444     NORMALLY DEFINED                                                    147
CNTINU      07,2423     NORMALLY DEFINED                                                    218
CODE           0110     DEFINED BY EQUALS                                                     7
COMP           7605     NORMALLY DEFINED                                                     57
COMPICK     05,2443     NORMALLY DEFINED                                                    159
COMPTEST    05,2376     NORMALLY DEFINED                                                    158
COMPTST1    05,2400     NORMALLY DEFINED                                                    158
CONTINU     07,3163     NORMALLY DEFINED                                                    226
CONUMNOR    05,2756     NORMALLY DEFINED                                                    168
COREINC     01,2416     NORMALLY DEFINED                                                    113
CORFOUND    01,2252     NORMALLY DEFINED                                                    110
COSINE      00,3431     NORMALLY DEFINED                                                     93
COUNT          0127     DEFINED BY EQUALS                                                     8
CRITCON     04,2176     NORMALLY DEFINED                                                    142

CYL            0022     DEFINED BY EQUALS                                                     5
CYLCHK      10,3202     NORMALLY DEFINED                                                    241
CYLCNTDN    10,3213     NORMALLY DEFINED                                                    241
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                          PAGE

CYLLOOP      10,3206     NORMALLY DEFINED                                               241
CYR             0020     DEFINED BY EQUALS                                                5
CYRCHK       10,3161     NORMALLY DEFINED                                               240
CYRCNTDN     10,3172     NORMALLY DEFINED                                               241
CYRCON          4733     NORMALLY DEFINED                                               210
CYRLOOP      10,3165     NORMALLY DEFINED                                               240


DAD             6750     NORMALLY DEFINED                                                40
DANZIG          6014     NORMALLY DEFINED                                                18
DAS++        07,2234     NORMALLY DEFINED                                               215
DAS++OV      07,2250     NORMALLY DEFINED                                               216
DAS+--+      07,2266     NORMALLY DEFINED                                               216
DAS--        07,2306     NORMALLY DEFINED                                               216
DAS--UV      07,2322     NORMALLY DEFINED                                               217
DATACALL        4116     NORMALLY DEFINED                                               106
DATAWAIT        4420     NORMALLY DEFINED                                               188
DATWAIT1        4426     NORMALLY DEFINED                                               189
DCOMP           7622     NORMALLY DEFINED                                                57
DDV             7514     NORMALLY DEFINED                                                55
DDVCALL      00,2722     NORMALLY DEFINED                                                81
DDV/BDDV     00,2332     NORMALLY DEFINED                                                70
DECBRNCH        0640     NORMALLY DEFINED                                                10
DECDSP3      05,2522     NORMALLY DEFINED                                               160
DECDSP       05,2445     NORMALLY DEFINED                                               159
DECEND       04,2152     NORMALLY DEFINED                                               142
DECON        04,2203     NORMALLY DEFINED                                               143
DECOUNT         0103     DEFINED BY EQUALS                                                7
DECRET          0101     DEFINED BY EQUALS                                                7
DECROUND     04,3132     NORMALLY DEFINED                                               177
DECTEM          0106     DEFINED BY EQUALS                                                7
DECTOBIN     04,2117     NORMALLY DEFINED                                               141
DEGCOM       04,2603     NORMALLY DEFINED                                               162
DEGCON1      04,2744     NORMALLY DEFINED                                               171
DEGCON2      04,2746     NORMALLY DEFINED                                               171
DEGINSF2     04,2712     NORMALLY DEFINED                                               170
DEGINSF      04,2701     NORMALLY DEFINED                                               170
DEGOUTSF     04,2533     NORMALLY DEFINED                                               161
DEGTAB       04,2613     NORMALLY DEFINED                                               162
DELR            1000     NORMALLY DEFINED                                                11
DELTAQ          1015     NORMALLY DEFINED                                                11
DELVEL          1006     NORMALLY DEFINED                                                11
DELVX           0756     NORMALLY DEFINED                                                11
DESOPTX         0752     NORMALLY DEFINED                                                11
DFRNT        04,3221     NORMALLY DEFINED                                               180
DIMCHK       07,2622     NORMALLY DEFINED                                               221
DIRADRES        6041     NORMALLY DEFINED                                                19
DISPBUF         1023     NORMALLY DEFINED                                                12
DISPLACE     05,2753     NORMALLY DEFINED                                               168
DISTEM          0106     DEFINED BY EQUALS                                                7
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SYMBOL      DEFINITION   HEALTH OF DEFINITION                                      PAGE

DLOAD           6464     NORMALLY DEFINED                                            33
DLOADCOD        7660     NORMALLY DEFINED                                            58
DLOAD*          7661     NORMALLY DEFINED                                            59
DMP1            7507     NORMALLY DEFINED                                            55
DMP             7062     NORMALLY DEFINED                                            44
DMPR            7511     NORMALLY DEFINED                                            55
DMPSUB          7066     NORMALLY DEFINED                                            44
DODLOAD         6454     NORMALLY DEFINED                                            32
DODLOAD*        6071     NORMALLY DEFINED                                            21
DOPROC       04,3430     NORMALLY DEFINED                                           190
DOSSHFT      00,2302     NORMALLY DEFINED                                            68
DOSTORE         6341     NORMALLY DEFINED                                            28
DOT             7275     NORMALLY DEFINED                                            49
DOTERM       04,3426     NORMALLY DEFINED                                           190
DOTINC          0122     NORMALLY DEFINED                                             8
DOTIXBR      01,2056     NORMALLY DEFINED                                            99
DOTRET          0123     NORMALLY DEFINED                                             8
DOTSUB          7134     NORMALLY DEFINED                                            46
DOUBLK       04,2513     NORMALLY DEFINED                                           148
DOVLOAD         6457     NORMALLY DEFINED                                            32
DOVLOAD*        6462     NORMALLY DEFINED                                            32
DP1OUTSF     04,2625     NORMALLY DEFINED                                           162
DP2OUTSF     04,2632     NORMALLY DEFINED                                           163
DP3OUTSF     04,2634     NORMALLY DEFINED                                           163
DPINCOM      04,3016     NORMALLY DEFINED                                           172
DPINORM      04,3024     NORMALLY DEFINED                                           172
DPINSF2      04,3026     NORMALLY DEFINED                                           172
DPINSF       04,3001     NORMALLY DEFINED                                           172
DPOSMAX         7625     NORMALLY DEFINED                                            58
DPOUT        04,2637     NORMALLY DEFINED                                           163
DPOUTCOM     04,2650     NORMALLY DEFINED                                           163
DPOUTNOR     04,2660     NORMALLY DEFINED                                           163
DPTEST1      05,2250     NORMALLY DEFINED                                           154
DPTEST       05,2236     NORMALLY DEFINED                                           153

DSALMOUT        0011     DEFINED BY EQUALS                                           14
DSEXIT          0100     DEFINED BY EQUALS                                            7
DSLV         04,3233     NORMALLY DEFINED                                           180
DSMAG           0126     DEFINED BY EQUALS                                            8
DSMSK        04,3235     NORMALLY DEFINED                                           180
DSP2BIT      05,3255     NORMALLY DEFINED                                           179
DSP2DEC      04,3133     NORMALLY DEFINED                                           178
DSPA         05,2340     NORMALLY DEFINED                                           158
DSPAB        05,2333     NORMALLY DEFINED                                           158
DSPABC       05,2326     NORMALLY DEFINED                                           158
DSPALARM     04,3255     NORMALLY DEFINED                                           181
DSPB         05,2345     NORMALLY DEFINED                                           158
DSPC         05,2352     NORMALLY DEFINED                                           158
DSPCNT          0714     NORMALLY DEFINED                                            10
DSPCOM1      05,2343     NORMALLY DEFINED                                           158
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SYMBOL      DEFINITION   HEALTH OF DEFINITION                                      PAGE

DSPCOM2      05,2357     NORMALLY DEFINED                                           158
DSPCOM3      05,2365     NORMALLY DEFINED                                           158
DSPCOUNT        0637     NORMALLY DEFINED                                            10
DSPDCEND     05,2513     NORMALLY DEFINED                                           160
DSPDCGET     05,2454     NORMALLY DEFINED                                           160
DSPDCPUT     05,2464     NORMALLY DEFINED                                           160
DSPDCWD1     04,3105     NORMALLY DEFINED                                           177
DSPDECWD     04,3057     NORMALLY DEFINED                                           177
DSPDPDEC     04,2662     NORMALLY DEFINED                                           163
DSPFMEM      05,3214     NORMALLY DEFINED                                           176
DSPIN1       04,3204     NORMALLY DEFINED                                           180
DSPIN        04,3157     NORMALLY DEFINED                                           179
DSPLAY       01,3132     NORMALLY DEFINED                                           130
DSPLAYC      01,3143     NORMALLY DEFINED                                           130
DSPLIST         0702     NORMALLY DEFINED                                            10
DSPLOCK         0652     NORMALLY DEFINED                                            10
DSPLV        05,3252     NORMALLY DEFINED                                           179
DSPMM1       05,3403     NORMALLY DEFINED                                           189
DSPMM        05,2001     NORMALLY DEFINED                                           149
DSPMMEND     05,3413     NORMALLY DEFINED                                           189
DSPMMTEM        0124     DEFINED BY EQUALS                                            8
DSPMSK          7652     DEFINED BY EQUALS                                          179
DSPOCTIN     04,3247     NORMALLY DEFINED                                           181
DSPOCTWO     05,3222     NORMALLY DEFINED                                           178
DSPOFF       01,3002     NORMALLY DEFINED                                           125
DSPOUT       01,3104     NORMALLY DEFINED                                           130
DSPSCAN      01,3115     NORMALLY DEFINED                                           130
DSPSFNOR     05,2507     NORMALLY DEFINED                                           160
DSPTAB          0662     NORMALLY DEFINED                                            10
DSPTEM1         0706     NORMALLY DEFINED                                            10
DSPTEM2         0711     NORMALLY DEFINED                                            10
DSQ          00,3107     NORMALLY DEFINED                                            87
DSQSUB       00,3217     NORMALLY DEFINED                                            89
DSREL           0125     DEFINED BY EQUALS                                            8
DSRUPTEM        0624     DEFINED BY EQUALS                                            9
DSRUPTSW        1020     NORMALLY DEFINED                                            12
DSU             6776     NORMALLY DEFINED                                            41
DUMMYJOB        4215     NORMALLY DEFINED                                           117
DV1++        10,2001     NORMALLY DEFINED                                           227
DV1+-        10,2015     NORMALLY DEFINED                                           227
DV1CON          4747     NORMALLY DEFINED                                           211
DV1-+        10,2024     NORMALLY DEFINED                                           227
DV1--        10,2031     NORMALLY DEFINED                                           227
DV2++        10,2041     NORMALLY DEFINED                                           227
DV2+-        10,2054     NORMALLY DEFINED                                           227
DV2CON          4750     NORMALLY DEFINED                                           211
DV2-+        10,2064     NORMALLY DEFINED                                           228
DV2--        10,2070     NORMALLY DEFINED                                           228
DV3++        10,2103     NORMALLY DEFINED                                           228
DV3+-        10,2111     NORMALLY DEFINED                                           228
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 SYMBOL      DEFINITION   HEALTH OF DEFINITION                                             PAGE

DV3-+         10,2120     NORMALLY DEFINED                                                  228
DV3--         10,2124     NORMALLY DEFINED                                                  228
DV4++         10,2134     NORMALLY DEFINED                                                  229
DV4+-         10,2146     NORMALLY DEFINED                                                  229
DV4-+         10,2156     NORMALLY DEFINED                                                  229
DV4--         10,2164     NORMALLY DEFINED                                                  229
DV5++         10,2200     NORMALLY DEFINED                                                  229
DV5+-         10,2210     NORMALLY DEFINED                                                  230
DV5-+         10,2221     NORMALLY DEFINED                                                  230
DV5--         10,2233     NORMALLY DEFINED                                                  230
DV6++         10,2250     NORMALLY DEFINED                                                  230
DV6+-         10,2264     NORMALLY DEFINED                                                  230
DV6-+         10,2272     NORMALLY DEFINED                                                  231
DV6--         10,2302     NORMALLY DEFINED                                                  231
DV7++         10,2312     NORMALLY DEFINED                                                  231
DV7+-         10,2323     NORMALLY DEFINED                                                  231
DV7-+         10,2331     NORMALLY DEFINED                                                  231
DV7--         10,2340     NORMALLY DEFINED                                                  231
DV8++         10,2347     NORMALLY DEFINED                                                  232
DV8+-         10,2361     NORMALLY DEFINED                                                  232
DV8-+         10,2371     NORMALLY DEFINED                                                  232
DV8--         10,2401     NORMALLY DEFINED                                                  232
DVNORM        00,2451     NORMALLY DEFINED                                                   73
DVNORMCT         0123     DEFINED BY EQUALS                                                   8
DVOVF         00,2355     NORMALLY DEFINED                                                   70
DV/SC            7553     NORMALLY DEFINED                                                   56
DVSIGN           0122     DEFINED BY EQUALS                                                   8
DVXSC            7372     NORMALLY DEFINED                                                   52
DWNRPTBB         4062     NORMALLY DEFINED                                                   16


EBANK            0003     DEFINED BY EQUALS                                                   5
EDOP             0023     DEFINED BY EQUALS                                                   5
EDOPCHK       10,3236     NORMALLY DEFINED                                                  241
EDOPLOOP      10,3242     NORMALLY DEFINED                                                  242
EIGHT            7643     DEFINED BY EQUALS BUT NEVER REFERRED TO                            58

EJ1           01,2542     NORMALLY DEFINED                                                  116
EJ2           01,2552     NORMALLY DEFINED                                                  116
EJSCAN        01,2475     NORMALLY DEFINED                                                  115
ELEVEN           7647     NORMALLY DEFINED                                                   58
ELRCODE       01,3241     NORMALLY DEFINED                                                  132
EMSD             0055     DEFINED BY EQUALS BUT NEVER REFERRED TO                             5
END2DEC       04,3156     NORMALLY DEFINED                                                  178
ENDALL        04,2150     NORMALLY DEFINED                                                  142
ENDCYL        10,3215     NORMALLY DEFINED                                                  241
ENDCYR        10,3174     NORMALLY DEFINED                                                  241
ENDDOT           7163     NORMALLY DEFINED                                                   46
ENDDPDEC      04,2700     NORMALLY DEFINED                                                  164
ENDDPUSH         6553     NORMALLY DEFINED                                                   34
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SYMBOL     DEFINITION   HEALTH OF DEFINITION                                   PAGE

ENDEDOP     10,3271     NORMALLY DEFINED                                       242
ENDEXECF       4251     DEFINED BY EQUALS                                      117
ENDEXECS    01,2557     DEFINED BY EQUALS                                      116
ENDFIND        4210     NORMALLY DEFINED                                       108
ENDIBNKF       4131     DEFINED BY EQUALS                                      106
ENDIDLE        4407     NORMALLY DEFINED                                       188
ENDINST        4417     NORMALLY DEFINED                                       188
ENDINTFF       4063     DEFINED BY EQUALS                                       16
ENDINTS1    01,2220     DEFINED BY EQUALS                                      104
ENDJOB1     01,2465     NORMALLY DEFINED                                       115
ENDMAXDV    00,2546     NORMALLY DEFINED                                        76
ENDMONDO    05,3207     NORMALLY DEFINED                                       176
ENDNMTST    04,2134     NORMALLY DEFINED                                       142
ENDNUM      04,2144     NORMALLY DEFINED                                       142
ENDNVBSY    04,3475     NORMALLY DEFINED                                       205
ENDOFJOB       4205     NORMALLY DEFINED                                       108
ENDPASTE       4354     NORMALLY DEFINED                                       176
ENDPRCHG    01,2363     NORMALLY DEFINED                                       111
ENDRQDAT    05,2273     NORMALLY DEFINED                                       154
ENDRQWT     05,3343     NORMALLY DEFINED                                       183
ENDRTOUT    05,2535     DEFINED BY EQUALS                                      161
ENDRUTIN    05,3077     DEFINED BY EQUALS                                      170
ENDSCALE    04,2734     NORMALLY DEFINED                                       171
ENDSPOCT    04,3252     NORMALLY DEFINED                                       181
ENDT4FF        4347     DEFINED BY EQUALS                                      128
ENDTASK        4267     NORMALLY DEFINED                                       118
ENDTPUSH       6555     NORMALLY DEFINED                                        34
ENDTSLC     00,2172     NORMALLY DEFINED                                        65
ENDVBFAN    05,2175     NORMALLY DEFINED                                       152
ENDVLOAD       6514     NORMALLY DEFINED                                        33
ENDVPUSH       6543     NORMALLY DEFINED                                        34
ENDVXV         6753     NORMALLY DEFINED                                        40
ENDWAITF       4333     DEFINED BY EQUALS                                      123
ENDWAITS    01,2677     DEFINED BY EQUALS                                      122
ENTER       05,2003     NORMALLY DEFINED                                       149
ENTERJMP    04,2051     NORMALLY DEFINED                                       141
ENTEXIT        0122     DEFINED BY EQUALS                                      149
ENTPASO     05,2031     NORMALLY DEFINED                                       149
ENTRET         0122     DEFINED BY EQUALS                                        8
ENTSET      05,3363     NORMALLY DEFINED                                       187
ERCNT          0103     DEFINED BY EQUALS                                        7
ERCOM       04,2373     NORMALLY DEFINED                                       146
ERCON       04,2405     NORMALLY DEFINED                                       146
ERCOUNT        1045     NORMALLY DEFINED                                        12
ERMINUS     04,2365     NORMALLY DEFINED                                       145
ERPLUS      04,2370     NORMALLY DEFINED                                       145
ERROR       04,2343     NORMALLY DEFINED                                       145
ERRORS         4770     NORMALLY DEFINED                                       211

ESCAPE2        0123     DEFINED BY EQUALS                                        8
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                                          PAGE

ESCAPE          0122     DEFINED BY EQUALS                                                                8
EVAC+2K         6707     NORMALLY DEFINED                                                                38
EXECBANK        4214     NORMALLY DEFINED                                                               108
EXECTEM1        0626     NORMALLY DEFINED                                                                 9
EXECTEM2        0627     NORMALLY DEFINED                                                                 9
EXIT            6730     NORMALLY DEFINED                                                                39
EXITEM          0100     DEFINED BY EQUALS                                                                7
EXTVBACT        0705     NORMALLY DEFINED                                                                10


FAILREG         0721     NORMALLY DEFINED                                                                11
FALTOF          4516     NORMALLY DEFINED                                                               201
FALTON          4512     NORMALLY DEFINED                                                               201
FBANK           0004     DEFINED BY EQUALS                                                                5
FBANKMSK        6232     DEFINED BY EQUALS                                                               24
FINALDV      00,2547     NORMALLY DEFINED                                                                77
FINDVAC2     01,2220     NORMALLY DEFINED                                                               109
FINDVAC         4142     NORMALLY DEFINED                                                               107
FIVE            7225     NORMALLY DEFINED                                                                47
FIXCLPAS     04,2262     NORMALLY DEFINED                                                               144
FIXEDADR        6062     NORMALLY DEFINED                                                                20
FIXLOC          0104     NORMALLY DEFINED                                                                 7
FIXRANGE     04,2572     NORMALLY DEFINED                                                               162
FIXROOT      00,3365     NORMALLY DEFINED                                                                91

FLASHOFF        4547     NORMALLY DEFINED                                                               202
FLASHON         4543     NORMALLY DEFINED                                                               202
FOUR            7644     DEFINED BY EQUALS                                                               58
FOURTEEN     00,3063     NORMALLY DEFINED                                                                85
FREDSPDO     04,3503     NORMALLY DEFINED                                                               207
FREEDSP         4650     NORMALLY DEFINED                                                               206
FREERET         0130     DEFINED BY EQUALS                                                                8
FREEWAIT     04,3476     NORMALLY DEFINED                                                               207

FULLDSP1     05,3452     NORMALLY DEFINED                                                               208
FULLDSP      05,3451     NORMALLY DEFINED                                                               208


GBIASX          0741     NORMALLY DEFINED                                                                11
GENDDV       00,2512     NORMALLY DEFINED                                                                75
GENSCL       00,2325     NORMALLY DEFINED                                                                69
GENSCR       00,2257     NORMALLY DEFINED                                                                68
GENSHFT2     00,2204     NORMALLY DEFINED                                                                66
GENSHIFT     00,2174     NORMALLY DEFINED                                                                66
GETINREL     04,2205     NORMALLY DEFINED                                                               143

GOBB            4054     NORMALLY DEFINED                                                                16
GODSPALM     05,2324     NORMALLY DEFINED                                                               155
GOPROG       01,2721     NORMALLY DEFINED                                                               124
GOQ          05,2712     NORMALLY DEFINED                                                               167
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                         PAGE

GOTO            6650     NORMALLY DEFINED                                              37
GRABDSP         4553     NORMALLY DEFINED                                             204
GRABLOCK        0677     NORMALLY DEFINED                                              10
GRABUSY1     04,3432     NORMALLY DEFINED                                             204
GRABUSY         4564     NORMALLY DEFINED                                             204
GRABUSYB     04,2000     NORMALLY DEFINED                                             140
GRABWAIT        4566     NORMALLY DEFINED                                             204

GSHIFT          7536     NORMALLY DEFINED                                              55
GTSFIN       06,2045     NORMALLY DEFINED                                             194
GTSFINLC     05,3042     NORMALLY DEFINED                                             169
GTSFOUT      06,2037     NORMALLY DEFINED                                             194
GTSFOUTL     05,2511     NORMALLY DEFINED                                             160
GYROCTR         0047     DEFINED BY EQUALS BUT NEVER REFERRED TO                        5


HALF            7631     DEFINED BY EQUALS                                             58
HI10         01,3311     NORMALLY DEFINED                                             133
HI5             4475     NORMALLY DEFINED                                             201
HIGH9           6231     NORMALLY DEFINED                                              24


IDAD1TEM        0134     NORMALLY DEFINED                                               8
IDAD2TEM        0135     NORMALLY DEFINED                                               8
IDAD3TEM        0136     NORMALLY DEFINED                                               8
IDADDTAB     06,2332     NORMALLY DEFINED                                             198
IDADDTEM        0126     DEFINED BY EQUALS BUT NEVER REFERRED TO                        8
IERASTST        6060     NORMALLY DEFINED                                              20

INCR         01,2040     NORMALLY DEFINED                                              99
INDERASE        6133     NORMALLY DEFINED                                              21
INDEX2          6111     NORMALLY DEFINED                                              21
INDEX           6073     NORMALLY DEFINED                                              21
INDEXLOC        0114     DEFINED BY EQUALS                                              7
INDJUMP         6235     NORMALLY DEFINED                                              25
INDWORK         6131     NORMALLY DEFINED                                              21
IN-OUT1      10,2412     NORMALLY DEFINED                                             232
INLINK          0045     DEFINED BY EQUALS                                              5
INREL           0123     DEFINED BY EQUALS                                              8
INRELTAB     04,2211     NORMALLY DEFINED                                             143
INTB15+         0100     NORMALLY DEFINED                                               7
INTBIT15        0101     NORMALLY DEFINED                                               7
INTMCTBS     05,2100     NORMALLY DEFINED                                             150
INTPRET         6000     NORMALLY DEFINED                                              17
INTRSM          6011     NORMALLY DEFINED                                              17


-0CHK           4754     NORMALLY DEFINED                                             211
-1CHK           4762     NORMALLY DEFINED                                             211
-1/2+2       00,2410     NORMALLY DEFINED                                              72
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 SYMBOL      DEFINITION    HEALTH OF DEFINITION                                              PAGE

-CCSPR        01,2507      NORMALLY DEFINED                                                   115
-ENDERAS         6234      NORMALLY DEFINED                                                    24
-ENDVAC          6171      NORMALLY DEFINED                                                    23

-OCT10           6142      NORMALLY DEFINED                                                    22
-ON           04,2313      NORMALLY DEFINED                                                   144

-UP           00,2542      NORMALLY DEFINED                                                    76


JOBSLEEP         4164      NORMALLY DEFINED                                                   108
JOBSLP1       01,2375      NORMALLY DEFINED                                                   112
JOBSLP2       01,2404      NORMALLY DEFINED                                                   112
JOBWAKE2      01,2406      NORMALLY DEFINED                                                   113
JOBWAKE3      01,2420      NORMALLY DEFINED                                                   113
JOBWAKE4      01,2412      NORMALLY DEFINED                                                   113
JOBWAKE          4170      NORMALLY DEFINED                                                   108


KEEP1            1034      NORMALLY DEFINED                                                    12
KEEP2            1035      NORMALLY DEFINED                                                    12
KEEP3            1036      NORMALLY DEFINED                                                    12
KEEP4            1037      NORMALLY DEFINED                                                    12
KEEP5            1040      NORMALLY DEFINED                                                    12
KEEP6            1041      NORMALLY DEFINED                                                    12
KEEP7            1042      NORMALLY DEFINED                                                    12
KEYCOM        01,3162      NORMALLY DEFINED                                                   131
KEYRPTBB         4061      NORMALLY DEFINED                                                    16
KEYRUPT1      01,3153      NORMALLY DEFINED                                                   131
KEYRUPT2      01,3175      NORMALLY DEFINED                                                   131
KEYTEMP1         0624      DEFINED BY EQUALS                                                    9
KEYTEMP2         0636      DEFINED BY EQUALS                                                    9
KILLMON       05,3153      NORMALLY DEFINED                                                   175
KILMONON         4400      NORMALLY DEFINED                                                   188


L                0001      DEFINED BY EQUALS                                                    5

LANDMARK         0733      NORMALLY DEFINED                                                    11
LARGE2        00,3023      NORMALLY DEFINED                                                    84
LARGE3        00,3005      NORMALLY DEFINED                                                    84
LARGE         00,2776      NORMALLY DEFINED                                                    83
LASINEX       00,3543      NORMALLY DEFINED                                                    95
LBUF2         00,2434      NORMALLY DEFINED                                                    72
LDANZIG       00,3625      NORMALLY DEFINED                                                    96
LEFT5            4456      NORMALLY DEFINED                                                   200
LEFT7COM      04,3035      NORMALLY DEFINED                                                   172
LEFT          00,2321      NORMALLY DEFINED                                                    69
LEFT-         00,2316      NORMALLY DEFINED                                                    69
LEGALTST      04,2446      NORMALLY DEFINED                                                   147
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                   PAGE

LEMONM          0056     DEFINED BY EQUALS BUT NEVER REFERRED TO                  5
LESCHK       01,3047     NORMALLY DEFINED                                       127

LOADLV1      05,2002     NORMALLY DEFINED                                       149
LOADLV       05,2663     NORMALLY DEFINED                                       167
LOADSTAT        0654     NORMALLY DEFINED                                        10
LOC             0150     NORMALLY DEFINED                                         9
LOCCTR          0635     NORMALLY DEFINED                                         9
LODMIXNN     06,2016     NORMALLY DEFINED                                       193
LODNLV       06,2034     NORMALLY DEFINED                                       193
LODNNLOC     05,2075     NORMALLY DEFINED                                       150
LODNNTAB     06,2000     NORMALLY DEFINED                                       193
LODSAMPT        4526     NORMALLY DEFINED                                       202
LOW10           6425     NORMALLY DEFINED                                        30
LOW11           4503     NORMALLY DEFINED                                       201
LOW2            6165     DEFINED BY EQUALS                                       58
LOW3            7652     DEFINED BY EQUALS                                       58
LOW4         01,2131     NORMALLY DEFINED                                       101
LOW5            4473     NORMALLY DEFINED                                       201
LOW6         05,3401     NORMALLY DEFINED                                       187
LOW7            6027     NORMALLY DEFINED                                        18
LOW7+2K         6230     NORMALLY DEFINED                                        24
LOW8            4504     NORMALLY DEFINED                                       201
LOW9         01,2503     NORMALLY DEFINED                                       115
LOWVERB      05,2030     NORMALLY DEFINED                                       149
LRUPT           0011     DEFINED BY EQUALS BUT NEVER REFERRED TO                  5

LST1         E3,1400     NORMALLY DEFINED                                        13
LST2         E3,1405     NORMALLY DEFINED                                        13
LST2CADR     05,2132     NORMALLY DEFINED                                       151
LST2CON      05,2131     NORMALLY DEFINED                                       151
LSTEMPTY     04,3512     NORMALLY DEFINED                                       207
LSTFULL      04,3514     NORMALLY DEFINED                                       207
LSTPTR          0130     DEFINED BY EQUALS                                        8
LTHVACA      01,3051     NORMALLY DEFINED                                       127
LV              0044     DEFINED BY EQUALS                                        6
LVBUF           7662     NORMALLY DEFINED                                        59
LVDSRUPT        4325     DEFINED BY EQUALS                                      130
LVSQUARE        0042     DEFINED BY EQUALS                                        6
LVWTLIST        4262     NORMALLY DEFINED                                       118
LXA          01,2010     NORMALLY DEFINED                                        98
LXC          01,2014     NORMALLY DEFINED                                        98


MAKECADR        4112     NORMALLY DEFINED                                       106
MATINC          0124     NORMALLY DEFINED                                         8
MAXDV        00,2564     NORMALLY DEFINED                                        78
MAXDVSW         0124     DEFINED BY EQUALS                                        8
MAXTEST      00,2507     NORMALLY DEFINED                                        74
MD1             4510     NORMALLY DEFINED                                       201
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                      PAGE

MEASMODE       1014      NORMALLY DEFINED                                            11
MEASQ          0726      NORMALLY DEFINED                                            11
MID5           4474      NORMALLY DEFINED                                           201
MID6        05,3402      NORMALLY DEFINED                                           187
MIDSIX         4355      NORMALLY DEFINED                                           176
MISCJUMP       6275      NORMALLY DEFINED                                            26
MIXAD       05,2235      NORMALLY DEFINED                                           153
MIXBR          0124      DEFINED BY EQUALS                                            8
MIXCON      06,2036      NORMALLY DEFINED                                           193
MIXNN1      05,2211      NORMALLY DEFINED                                           153
MIXNN2      05,2223      NORMALLY DEFINED                                           153
MIXNOUN     05,2176      NORMALLY DEFINED                                           153
MIXTEMP        0111      DEFINED BY EQUALS                                            7

MMCHANG     05,3267      NORMALLY DEFINED                                           181
MNKEYIN        0015      DEFINED BY EQUALS                                           14
MODE           0147      NORMALLY DEFINED                                             9
MODREG         0651      NORMALLY DEFINED                                            10
MODROUTB    04,3255      DEFINED BY EQUALS                                          182
MONBACK     05,3211      NORMALLY DEFINED                                           176
MONBUSY     05,3212      NORMALLY DEFINED                                           176
MONDEL      05,3157      NORMALLY DEFINED                                           175
MONDO       05,3160      NORMALLY DEFINED                                           175
MONIT1      05,3101      NORMALLY DEFINED                                           174
MONITOR     05,3077      NORMALLY DEFINED                                           174
MONMASK     05,3210      NORMALLY DEFINED                                           176
MONREQ      05,3134      NORMALLY DEFINED                                           175
MONSAVE1       0661      NORMALLY DEFINED                                            10
MONSAVE        0660      NORMALLY DEFINED                                            10
MORNUM      04,2173      NORMALLY DEFINED                                           142
MP1++       07,3017      NORMALLY DEFINED                                           224
MP1+-       07,3024      NORMALLY DEFINED                                           224
MP1-+       07,3030      NORMALLY DEFINED                                           224
MP1--       07,3034      NORMALLY DEFINED                                           224
MP2++       07,3043      NORMALLY DEFINED                                           225
MP2+-       07,3050      NORMALLY DEFINED                                           225
MP2-+       07,3054      NORMALLY DEFINED                                           225
MP2--       07,3060      NORMALLY DEFINED                                           225
MP3++       07,3067      NORMALLY DEFINED                                           225
MP3+-       07,3074      NORMALLY DEFINED                                           225
MP3-+       07,3101      NORMALLY DEFINED                                           225
MP3--       07,3106      NORMALLY DEFINED                                           225
MP4++       07,3113      NORMALLY DEFINED                                           226
MP4+-       07,3120      NORMALLY DEFINED                                           226
MP4-+       07,3124      NORMALLY DEFINED                                           226
MP4--       07,3131      NORMALLY DEFINED                                           226
MP5++       07,3136      NORMALLY DEFINED                                           226
MP5+-       07,3144      NORMALLY DEFINED                                           226
MP5-+       07,3150      NORMALLY DEFINED                                           226
MP5--       07,3155      NORMALLY DEFINED                                           226
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                                   PAGE

MPAC            0140     NORMALLY DEFINED                                                          9
MPAC+        00,2403     NORMALLY DEFINED                                                         72
MPAC-        00,2377     NORMALLY DEFINED                                                         70
MPACSHR      00,2014     NORMALLY DEFINED                                                         61
MPACSRND     00,2031     NORMALLY DEFINED                                                         61
MPACVBUF        7475     NORMALLY DEFINED                                                         54
MPTEMP          0121     NORMALLY DEFINED                                                          8

MSKCHK       07,2051     NORMALLY DEFINED                                                        213
MXV             7300     NORMALLY DEFINED                                                         49


NAVKEYIN        0016     DEFINED BY EQUALS                                                        14
NDI             4507     NORMALLY DEFINED                                                        201
NDCMPTST     05,2417     NORMALLY DEFINED                                                        159
NDX+0           1025     NORMALLY DEFINED                                                         12
NDX+MAX         1026     NORMALLY DEFINED                                                         12
NDXAUG       10,3033     NORMALLY DEFINED                                                        238
NDXBZMF      10,2740     NORMALLY DEFINED                                                        237
NDXCHK       07,2371     NORMALLY DEFINED                                                        218
NDXDCA       10,2744     NORMALLY DEFINED                                                        237
NDXDIM       10,3042     NORMALLY DEFINED                                                        239
NDXDV        10,2772     NORMALLY DEFINED                                                        238
NDXINOUT     10,3051     NORMALLY DEFINED                                                        239
NDXKEEP1        1027     NORMALLY DEFINED                                                         12
NDXKEEP2        1030     NORMALLY DEFINED                                                         12
NDXKEEP3        1031     NORMALLY DEFINED                                                         12
NDXMSU       10,3013     NORMALLY DEFINED                                                        238
NDXQXCH      10,3022     NORMALLY DEFINED                                                        238
NDXSELF1        1032     NORMALLY DEFINED                                                         12
NDXSELF2        1033     NORMALLY DEFINED                                                         12
NEG0            7654     NORMALLY DEFINED                                                         58
NEG12        00,2273     NORMALLY DEFINED                                                         68
NEG180       04,2736     NORMALLY DEFINED                                                        171
NEG1            7655     DEFINED BY EQUALS                                                        58
NEG1/2          7627     NORMALLY DEFINED                                                         58
NEG2            7656     NORMALLY DEFINED                                                         58
NEG4            6045     NORMALLY DEFINED                                                         19
NEG5         05,2077     NORMALLY DEFINED                                                        150
NEG             6726     NORMALLY DEFINED                                                         39
NEG.2        04,2750     NORMALLY DEFINED                                                        171
NEGMAX          7630     DEFINED BY EQUALS                                                        58
NEGONE          7655     NORMALLY DEFINED                                                         58
NEGOPT       04,2555     NORMALLY DEFINED                                                        161
NEGSGN       04,2254     NORMALLY DEFINED                                                        144
NETZERO         6054     NORMALLY DEFINED                                                         20
NEWJOB          0067     NORMALLY DEFINED                                                          6
NEWLOC          0633     NORMALLY DEFINED                                                          9
NEWMODE         6013     NORMALLY DEFINED                                                         18
NEWOPS          6023     NORMALLY DEFINED                                                         18
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SYMBOL     DEFINITION   HEALTH OF DEFINITION                                              PAGE

NEWPRIO         0632    NORMALLY DEFINED                                                     9
NEXTCORE     01,2310    NORMALLY DEFINED                                                   110
NINE            7651    NORMALLY DEFINED                                                    58

NNADTAB      06,2052    NORMALLY DEFINED                                                   194
NNADTEM         0132    NORMALLY DEFINED                                                     8
NNTYPTAB     06,2152    NORMALLY DEFINED                                                   195
NNTYPTEM        0133    NORMALLY DEFINED                                                     8
NO.CORES     01,2250    NORMALLY DEFINED                                                   109
NO.WDS          6164    NORMALLY DEFINED                                                    22
NORMTEST     00,3424    NORMALLY DEFINED                                                    92
NOTBITI2     04,2406    NORMALLY DEFINED                                                   146
NOUN         04,2250    NORMALLY DEFINED                                                   144
NOUNADD         0131    DEFINED BY EQUALS                                                    8
NOUNCADR        0657    NORMALLY DEFINED                                                    10
NOUNREG         0642    NORMALLY DEFINED                                                    10
NOUNTEM         0106    DEFINED BY EQUALS                                                    7
NOUT            0656    NORMALLY DEFINED                                                    10
NOUTCON         7647    DEFINED BY EQUALS                                                   58
NOVAC2       01,2241    NORMALLY DEFINED                                                   109
NOVAC3       01,2244    NORMALLY DEFINED                                                   109
NOVAC           4131    NORMALLY DEFINED                                                   107

NUCHANGE        4241    NORMALLY DEFINED                                                   117
NUDIRECT        4235    NORMALLY DEFINED                                                   117
NUM          04,2062    NORMALLY DEFINED                                                   141
NVBNKTEM        0701    NORMALLY DEFINED                                                    10
NVCOM        04,2240    NORMALLY DEFINED                                                   143
NVQTEM          0700    NORMALLY DEFINED                                                    10
NVSBBBNK        4371    NORMALLY DEFINED                                                   186
NVSBENDL     04,3265    NORMALLY DEFINED                                                   181
NVSBWAIT        4601    NORMALLY DEFINED                                                   205
NVSBWT1         4606    NORMALLY DEFINED                                                   205
NVSUB1       05,3344    NORMALLY DEFINED                                                   187
NVSUB           4356    NORMALLY DEFINED                                                   186
NVSUBB       05,2000    NORMALLY DEFINED                                                   149
NVSUBCOM        4365    NORMALLY DEFINED                                                   186
NVSUBEND        4376    NORMALLY DEFINED                                                   187
NVSUBMON        4372    NORMALLY DEFINED                                                   187
NVSUBSY1     04,3454    NORMALLY DEFINED                                                   205
NVSUBSYB     04,2001    NORMALLY DEFINED                                                   140
NVSUBUSY        4576    NORMALLY DEFINED                                                   205
NVTEMP          0107    DEFINED BY EQUALS                                                    7


OCT1400         4505    NORMALLY DEFINED                                                   201
OCT176       00,2107    NORMALLY DEFINED                                                    63
OCT23           6227    NORMALLY DEFINED                                                    24
OCT40001        6042    NORMALLY DEFINED                                                    19
OCT50001     01,2657    NORMALLY DEFINED                                                   121
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 SYMBOL     DEFINITION    HEALTH OF DEFINITION                                PAGE

OCTBACK      05,3250      NORMALLY DEFINED                                    179

OLDERR          1021      NORMALLY DEFINED                                     12
ONE             7646      DEFINED BY EQUALS                                    58
OPDEGIN2     04,2771      NORMALLY DEFINED                                    171
OPDEGOUT     04,2541      NORMALLY DEFINED                                    161
OPJUMP2         6167      NORMALLY DEFINED                                     23
OPJUMP3         6217      NORMALLY DEFINED                                     24
OPJUMP          6032      NORMALLY DEFINED                                     18
OPTDEGIN     04,2764      NORMALLY DEFINED                                    171
OPTX            0036      DEFINED BY EQUALS                                     5
OPTXCMD         0054      DEFINED BY EQUALS BUT NEVER REFERRED TO               5
OPTY            0035      DEFINED BY EQUALS                                     5
OPTYCMD         0053      DEFINED BY EQUALS BUT NEVER REFERRED TO               5

OUTO            0010      DEFINED BY EQUALS                                    14
OUTLINK         0057      DEFINED BY EQUALS BUT NEVER REFERRED TO               6
OVERFLOW        7006      NORMALLY DEFINED                                     41
OVFIND          0105      NORMALLY DEFINED                                      7


PASTEVB         4347      NORMALLY DEFINED                                    176
PBIASX          0764      NORMALLY DEFINED                                     11
PBIASY          0766      NORMALLY DEFINED                                     11
PBIASZ          0770      NORMALLY DEFINED                                     11
PDDL            6526      NORMALLY DEFINED                                     34
PDVL            6562      NORMALLY DEFINED                                     35
PIPASCFX        0765      NORMALLY DEFINED                                     11
PIPASCFY        0767      NORMALLY DEFINED                                     11
PIPASCFZ        0771      NORMALLY DEFINED                                     11
PIPAX           0037      DEFINED BY EQUALS                                     5
PIPAY           0040      DEFINED BY EQUALS BUT NEVER REFERRED TO               5
PIPAZ           0041      DEFINED BY EQUALS BUT NEVER REFERRED TO               5

POLISH          0103      NORMALLY DEFINED                                      7
POLY2           7215      NORMALLY DEFINED                                     47
POLY            7173      NORMALLY DEFINED                                     47
POLYCNT         0124      DEFINED BY EQUALS                                     8
POLYLOOP        7212      NORMALLY DEFINED                                     47
POLYRET         0125      DEFINED BY EQUALS                                     8
POS1/2          7631      DEFINED BY EQUALS                                    58
POSGN        04,2267      NORMALLY DEFINED                                    144
POSMAX          7626      NORMALLY DEFINED                                     58
POSTJUMP        4102      NORMALLY DEFINED                                    105
PREDOT          7132      NORMALLY DEFINED                                     46
PREGBSY         4561      NORMALLY DEFINED                                    204
PRENVBSY        4573      NORMALLY DEFINED                                    205
PRESINE      00,3440      NORMALLY DEFINED                                     93
PRESTORE        6420      NORMALLY DEFINED                                     30
PRIOCH2      01,2454      NORMALLY DEFINED                                    114
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SYMBOL     DEFINITION   HEALTH OF DEFINITION                                        PAGE

PRIOCHNG       4176     NORMALLY DEFINED                                             108
PRIORITY       0153     NORMALLY DEFINED                                               9

PUSH        00,3167     NORMALLY DEFINED                                              88
PUSHLOC        0152     NORMALLY DEFINED                                               9
PUSHUP         6135     NORMALLY DEFINED                                              22
PUTADD      05,2307     NORMALLY DEFINED                                             154
PUTCOM2     05,3040     NORMALLY DEFINED                                             169
PUTCOM      05,2762     NORMALLY DEFINED                                             168
PUTDCSF2    05,3064     NORMALLY DEFINED                                             170
PUTDECSF    05,3051     NORMALLY DEFINED                                             169
PUTDPCOM    05,3014     NORMALLY DEFINED                                             169
PUTINLST    04,3450     NORMALLY DEFINED                                             204
PUTNORM     05,3023     NORMALLY DEFINED                                             169
PUTSFNOR    05,3063     NORMALLY DEFINED                                             170
PUTXY       05,2602     NORMALLY DEFINED                                             165
PUTXYZ      05,2550     NORMALLY DEFINED                                             165


Q              0002     DEFINED BY EQUALS                                              5

QNMBR       07,2550     NORMALLY DEFINED                                             220
QPRET          0052     DEFINED BY EQUALS                                              6
QRUPT          0012     DEFINED BY EQUALS                                              5

QUARTER        7632     DEFINED BY EQUALS                                             58
QXCHCON1    07,2555     NORMALLY DEFINED                                             220
QXCHCON2    07,2556     NORMALLY DEFINED                                             221


R1D1           4444     NORMALLY DEFINED                                             200
R2D1           4445     NORMALLY DEFINED                                             200
R3D1           4446     NORMALLY DEFINED                                             200

RANDCHK     10,2435     NORMALLY DEFINED                                             233
RANDOV      10,2460     NORMALLY DEFINED                                             233
RECAL1      04,3406     NORMALLY DEFINED                                             189
RECAL2      04,3417     NORMALLY DEFINED                                             190
RECAL3      04,3424     NORMALLY DEFINED                                             190
RECALTST    04,3400     NORMALLY DEFINED                                             189
REGUP          6153     NORMALLY DEFINED                                              22
RELDSP1        4633     NORMALLY DEFINED                                             206
RELDSP2        4623     NORMALLY DEFINED                                             206
RELDSP         4610     NORMALLY DEFINED                                             206
RELDSPON       4522     NORMALLY DEFINED                                             202
RELRET         0130     DEFINED BY EQUALS                                              8
RELTAB11       4346     NORMALLY DEFINED                                             128
RELTAB         4333     NORMALLY DEFINED                                             128
RELWORK        6210     NORMALLY DEFINED                                              23
REQADD      05,2055     NORMALLY DEFINED                                             150
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SYMBOL     DEFINITION   HEALTH OF DEFINITION                                        PAGE

REQCOM      05,2257     NORMALLY DEFINED                                             154
REQDATX     05,2252     NORMALLY DEFINED                                             154
REQDATY     05,2254     NORMALLY DEFINED                                             154
REQDATZ     05,2256     NORMALLY DEFINED                                             154
REQEX1      05,3321     NORMALLY DEFINED                                             182
REQEXLOC    05,2166     NORMALLY DEFINED                                             151
REQMM       05,3302     NORMALLY DEFINED                                             182
REQRET         0653     NORMALLY DEFINED                                              10
REQUESTC    05,3325     NORMALLY DEFINED                                             182
RESTORSR    01,3270     NORMALLY DEFINED                                             133
RESUME         4325     NORMALLY DEFINED                                             123
REVCNT         6162     NORMALLY DEFINED                                              22
RIGHT5         4447     NORMALLY DEFINED                                             200
RIGHT       00,2216     NORMALLY DEFINED                                              67
RIGHT-      00,2312     NORMALLY DEFINED                                              69
RIGHTR      00,2012     NORMALLY DEFINED                                              60

RNRAD          0046     DEFINED BY EQUALS BUT NEVER REFERRED TO                        5
ROLL           0730     NORMALLY DEFINED                                              11
RORCHK      10,2542     NORMALLY DEFINED                                             234
ROROV       10,2573     NORMALLY DEFINED                                             235
ROUND       00,3111     NORMALLY DEFINED                                              87
ROUNDSUB       7115     NORMALLY DEFINED                                              45

RTB         01,2070     NORMALLY DEFINED                                             100
RTB/BHIZ    01,2067     NORMALLY DEFINED                                             100
RUPTAGN        0636     NORMALLY DEFINED                                               9
RUTMXTAB    06,2422     NORMALLY DEFINED                                             199
RUTMXTEM       0137     NORMALLY DEFINED                                               8
RVQ         00,3214     NORMALLY DEFINED                                              88
RXORCHK     10,2664     NORMALLY DEFINED                                             236
RXORUV      10,2715     NORMALLY DEFINED                                             237


/AGREE      00,2725     NORMALLY DEFINED                                              82
/BUF+       00,2637     NORMALLY DEFINED                                              80
/BUF-       00,2633     NORMALLY DEFINED                                              79

/MPAC+      00,2714     NORMALLY DEFINED                                              81
/MPAC-      00,2710     NORMALLY DEFINED                                              81
/NORM2      00,2652     NORMALLY DEFINED                                              80
/NORM       00,2657     NORMALLY DEFINED                                              80


S13BITS        4723     NORMALLY DEFINED                                             210
S1             0050     DEFINED BY EQUALS BUT NEVER REFERRED TO                        6
S2             0051     DEFINED BY EQUALS BUT NEVER REFERRED TO                        6
S6BITS         4721     NORMALLY DEFINED                                             210
S7BITS         4722     NORMALLY DEFINED                                             210
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SYMBOL      DEFINITION   HEALTH OF DEFINITION                                PAGE

S+1              4712    NORMALLY DEFINED                                     210
S+2              4713    NORMALLY DEFINED                                     210
S+3              4714    NORMALLY DEFINED                                     210
S+4              4715    NORMALLY DEFINED                                     210
S+5              4716    NORMALLY DEFINED                                     210
S+6              4717    NORMALLY DEFINED                                     210
S+7              4720    NORMALLY DEFINED                                     210
S+MAX            4725    NORMALLY DEFINED                                     210
S+ZERO           4711    NORMALLY DEFINED                                     210
SAMPTIME         0754    NORMALLY DEFINED                                      11
SBIT10           4703    NORMALLY DEFINED                                     210
SBIT11           4704    NORMALLY DEFINED                                     210
SBIT12           4705    NORMALLY DEFINED                                     210
SBIT13           4706    NORMALLY DEFINED                                     210
SBIT14           4707    NORMALLY DEFINED                                     210
SBIT15           4710    NORMALLY DEFINED                                     210
SBIT1            4672    NORMALLY DEFINED                                     210
SBIT2            4673    NORMALLY DEFINED                                     210
SBIT3            4674    NORMALLY DEFINED                                     210
SBIT4            4675    NORMALLY DEFINED                                     210
SBIT5            4676    NORMALLY DEFINED                                     210
SBIT6            4677    NORMALLY DEFINED                                     210
SBIT7            4700    NORMALLY DEFINED                                     210
SBIT8            4701    NORMALLY DEFINED                                     210
SBIT9            4702    NORMALLY DEFINED                                     210
SCOUNT           1046    NORMALLY DEFINED                                      12
SCOUTEND      04,2623    NORMALLY DEFINED                                     162
SELF1         07,2411    NORMALLY DEFINED                                     218
SELF2         07,2417    NORMALLY DEFINED                                     218
SELF3         07,2473    NORMALLY DEFINED                                     219
SELFBANK         4250    NORMALLY DEFINED                                     117
SELFRET          1043    NORMALLY DEFINED                                      12
SETAUG        04,2565    NORMALLY DEFINED                                     162
SETEBANK         4440    NORMALLY DEFINED                                     200
SETLOC        01,2275    NORMALLY DEFINED                                     110
SETNADD          4436    NORMALLY DEFINED                                     200
SETNCADR         4430    NORMALLY DEFINED                                     200
SETOVF2          7130    NORMALLY DEFINED                                      45
SETOVF           7060    NORMALLY DEFINED                                      43
SETPD            7530    NORMALLY DEFINED                                      55
SETROUND      00,2252    NORMALLY DEFINED                                      67
SETVAC        05,3336    NORMALLY DEFINED                                     182
SEVEN            7652    NORMALLY DEFINED                                      58
SEVENS           4731    NORMALLY DEFINED                                     210
SFAIL            1044    NORMALLY DEFINED                                      12
SFCOM         06,2043    NORMALLY DEFINED                                     194
SFCONUM       05,2734    NORMALLY DEFINED                                     168
SFINTAB       06,2252    NORMALLY DEFINED                                     197
SFINTABR      05,3067    NORMALLY DEFINED                                     170
SFOUTAB       06,2302    NORMALLY DEFINED                                     197
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SYMBOL     DEFINITION  HEALTH OF DEFINITION                                   PAGE

SFOUTABR    05,2525    NORMALLY DEFINED                                       161
SFRET1      05,2733    NORMALLY DEFINED                                       167
SFRET       05,2751    NORMALLY DEFINED                                       168
SFRUTMIX    05,2721    NORMALLY DEFINED                                       167
SFRUTNOR    05,2713    NORMALLY DEFINED                                       167
SFTEMP1        0107    DEFINED BY EQUALS                                        7
SFTEMP2        0110    DEFINED BY EQUALS                                        7
SGNCOM      04,2302    NORMALLY DEFINED                                       144
SGNOFF         0107    DEFINED BY EQUALS                                        7
SGNON          0106    DEFINED BY EQUALS                                        7
SGNTAB      04,2323    NORMALLY DEFINED                                       144
SGNTO1      04,2740    NORMALLY DEFINED                                       171
SGNTST1     04,2336    NORMALLY DEFINED                                       145
SHOLTS      05,3456    NORMALLY DEFINED                                       209
SHORTMP        7257    NORMALLY DEFINED                                        48
SHORTT      00,2000    NORMALLY DEFINED                                        60
SHORTV      00,2102    NORMALLY DEFINED                                        63
SHOTIME        4661    NORMALLY DEFINED                                       206
SIGN           7572    NORMALLY DEFINED                                        57
SIGNFIX     04,2722    NORMALLY DEFINED                                       171
SIGNRET        0111    DEFINED BY EQUALS BUT NEVER REFERRED TO                  7
SIGNTEST    04,2326    NORMALLY DEFINED                                       145
SINBLANK    04,2510    NORMALLY DEFINED                                       148
SINE        00,3442    NORMALLY DEFINED                                        93
SINOUT1        4730    NORMALLY DEFINED                                       210
SINOUT2        4732    NORMALLY DEFINED                                       210
SINOUT3        4734    NORMALLY DEFINED                                       210
SIX            6162    DEFINED BY EQUALS                                       58

S-14           4736    NORMALLY DEFINED                                       210
S-15           4735    NORMALLY DEFINED                                       210
S-1            4745    NORMALLY DEFINED                                       211
S-2            4744    NORMALLY DEFINED                                       211
S-3            4743    NORMALLY DEFINED                                       211
S-4            4742    NORMALLY DEFINED                                       211
S-5            4741    NORMALLY DEFINED                                       211
S-6            4740    NORMALLY DEFINED                                       211
S-7            4737    NORMALLY DEFINED                                       210
S-MAX          4726    NORMALLY DEFINED                                       210
S-ZERO         4746    NORMALLY DEFINED                                       211
SLAP1       01,2677    NORMALLY DEFINED                                       124
SLAP2       01,2715    NORMALLY DEFINED                                       124
SLEFT5         4465    NORMALLY DEFINED                                       201
SLOAD2         6467    NORMALLY DEFINED                                        33
SLOAD          6504    NORMALLY DEFINED                                        33
SLOPEHI     00,2274    NORMALLY DEFINED                                        68
SLOPELO     00,2740    NORMALLY DEFINED                                        82
SMALL2      00,2773    NORMALLY DEFINED                                        83
SMALL       00,3044    NORMALLY DEFINED                                        85
SMODE          1047    NORMALLY DEFINED                                        12
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 SYMBOL     DEFINITION    HEALTH OF DEFINITION                                      PAGE

SMODECHK        5010      NORMALLY DEFINED                                           212
SMPAC+       00,3322      NORMALLY DEFINED                                            91
SN1          00,3465      NORMALLY DEFINED                                            94
SODD            4724      NORMALLY DEFINED                                           210
SPECRUPT     01,3063      NORMALLY DEFINED                                           128
SPECTEST     01,2265      NORMALLY DEFINED                                           110
SQRT         00,3125      NORMALLY DEFINED                                            87
SQRTABRT     00,3321      NORMALLY DEFINED                                            90
SQRTNEG      00,3312      NORMALLY DEFINED                                            90
SQRTNM2      00,3407      NORMALLY DEFINED                                            92
SQRTNORM     00,3414      NORMALLY DEFINED                                            92
SQRTSHFT     00,3137      NORMALLY DEFINED                                            87
SQRTSUB      00,3262      NORMALLY DEFINED                                            90
SR              0021      DEFINED BY EQUALS                                            5
SRCHK        10,3221      NORMALLY DEFINED                                           241
SRCNTDN      10,3234      NORMALLY DEFINED                                           241
SRDDV        00,2005      NORMALLY DEFINED                                            60
SRGHT5       01,3274      NORMALLY DEFINED                                           133
SRLOOP       10,3225      NORMALLY DEFINED                                           241
SRTEST       00,3370      NORMALLY DEFINED                                            92

SSP             6623      NORMALLY DEFINED                                            35
STADR           6334      NORMALLY DEFINED                                            28
STARTEB      01,2722      NORMALLY DEFINED                                           124
STARTSTO        6430      NORMALLY DEFINED                                            31
STARTSUB     01,2723      NORMALLY DEFINED                                           124
STATE           0620      NORMALLY DEFINED                                             9
STOPCHK         5005      NORMALLY DEFINED                                           211
STORE1          6626      NORMALLY DEFINED                                            35
STORE           6421      NORMALLY DEFINED                                            30
STORE,1         6413      NORMALLY DEFINED                                            30
STORE,2         6416      NORMALLY DEFINED                                            30
STORJUMP        6351      NORMALLY DEFINED                                            29
STRTCHK         5017      NORMALLY DEFINED                                           212
STRTXTRA     07,2504      NORMALLY DEFINED                                           220
SUBTR        00,3614      NORMALLY DEFINED                                            96
SVCT3           4271      NORMALLY DEFINED                                           118
SWBIT           0115      DEFINED BY EQUALS                                            8
SWBRANCH        6702      NORMALLY DEFINED                                            38
SWCALL          4067      NORMALLY DEFINED                                           105
SWITCHES     01,2135      NORMALLY DEFINED                                           102
SWRETURN        4076      NORMALLY DEFINED                                           105
SW/          01,2135      DEFINED BY EQUALS                                          104
SWSGN        04,3345      NORMALLY DEFINED                                           184
SWSKIP       01,2216      NORMALLY DEFINED                                           104
SWSTORE      01,2172      NORMALLY DEFINED                                           103
SWTAB        04,3374      NORMALLY DEFINED                                           185
SWWORD          0114      DEFINED BY EQUALS                                            7
SXA          01,2020      NORMALLY DEFINED                                            98
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 SYMBOL      DEFINITION    HEALTH OF DEFINITION                                             PAGE

T3RPTBB          4057      NORMALLY DEFINED                                                   16
T3RUPT2          4275      NORMALLY DEFINED                                                  123
T3RUPT           4272      NORMALLY DEFINED                                                  123
T4RPTBB          4060      NORMALLY DEFINED                                                   16
T4RUPT        01,3052      NORMALLY DEFINED                                                  128
T4RUPTA       01,3072      NORMALLY DEFINED                                                  128
T5RPTBB          4056      NORMALLY DEFINED                                                   16
T6RPTBB          4055      NORMALLY DEFINED                                                   16

TABLNTH       01,3122      NORMALLY DEFINED                                                  130
TAD              7047      NORMALLY DEFINED                                                   43
TAGSUB        01,2061      NORMALLY DEFINED                                                   99
TASKOVER         4321      NORMALLY DEFINED                                                  123
TCCHK         07,2003      NORMALLY DEFINED                                                  212
TCFINDVC         4501      NORMALLY DEFINED                                                  201
TCNOVAC          4476      NORMALLY DEFINED                                                  201
TCSUBTR       00,2247      NORMALLY DEFINED                                                   67
TCTSKOVR         4500      NORMALLY DEFINED                                                  201
TCWAIT           4477      NORMALLY DEFINED                                                  201
TDEC             0722      NORMALLY DEFINED                                                   11
TEM1             0125      NORMALLY DEFINED                                                    8
TEM2             0126      NORMALLY DEFINED                                                    8
TEM3             0127      NORMALLY DEFINED                                                    8
TEM4             0130      NORMALLY DEFINED                                                    8
TEM5             0131      NORMALLY DEFINED                                                    8
TEN              7650      NORMALLY DEFINED                                                   58
TEST          01,2204      NORMALLY DEFINED                                                  104
TESTNN        05,2037      NORMALLY DEFINED                                                  150
TESTOFUF      04,3053      NORMALLY DEFINED                                                  173
TESTVB        05,2033      NORMALLY DEFINED                                                  149
TET              0724      NORMALLY DEFINED                                                   11
THETAD           0716      NORMALLY DEFINED                                                   11
THIRTEEN      00,3062      NORMALLY DEFINED                                                   85
THREE            6165      DEFINED BY EQUALS                                                  58
TIME1            0025      DEFINED BY EQUALS                                                   5
TIME2            0024      DEFINED BY EQUALS                                                   5
TIME3            0026      DEFINED BY EQUALS                                                   5
TIME4            0027      DEFINED BY EQUALS                                                   5
TIME5            0030      DEFINED BY EQUALS BUT NEVER REFERRED TO                             5
TIME6            0031      DEFINED BY EQUALS BUT NEVER REFERRED TO                             5
TIX           01,2047      NORMALLY DEFINED                                                   99

TLOAD            6473      NORMALLY DEFINED                                                   33
TMALM            4325      DEFINED BY EQUALS                                                 133
TMFAIL1       01,3266      NORMALLY DEFINED                                                  133
TMFAIL2       01,3256      NORMALLY DEFINED                                                  132
TMKEYBUF         1024      NORMALLY DEFINED                                                   12
TPAGREE          7226      NORMALLY DEFINED                                                   48
TPDVL            6613      NORMALLY DEFINED                                                   35
TPLEFT7       04,3032      NORMALLY DEFINED                                                  172
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                   PAGE

TPSL1          4532      NORMALLY DEFINED                                        202
TPUSH       00,3212      NORMALLY DEFINED                                         88
TRACE1      04,3110      NORMALLY DEFINED                                        177
TRACE1S     04,3121      NORMALLY DEFINED                                        177

TSLC2       00,2153      NORMALLY DEFINED                                         65
TSLC           7533      NORMALLY DEFINED                                         55
TSLCLOOP    00,2161      NORMALLY DEFINED                                         65
TSLCTEST    00,2167      NORMALLY DEFINED                                         65
TSSL        00,2062      NORMALLY DEFINED                                         62
TSSR        00,2006      NORMALLY DEFINED                                         60
TSTAB       04,2355      NORMALLY DEFINED                                        145
TSTCON1     05,3453      NORMALLY DEFINED                                        208
TSTCON2     05,3454      NORMALLY DEFINED                                        208
TSTCON3     05,3455      NORMALLY DEFINED                                        208
TSTFORDP    05,2420      NORMALLY DEFINED                                        159
TSTLTS1     05,3426      NORMALLY DEFINED                                        208
TSTLTS2     05,3457      NORMALLY DEFINED                                        209
TSTLTS3     05,3464      NORMALLY DEFINED                                        209
TSTORE         6450      NORMALLY DEFINED                                         31
TSTUPLOK    01,3247      NORMALLY DEFINED                                        132
TWO            7645      DEFINED BY EQUALS                                        58


UMPAC+      00,3103      NORMALLY DEFINED                                         86
UMPAC-      00,3075      NORMALLY DEFINED                                         86
UNAJUMP        6315      NORMALLY DEFINED                                         27
UNIT        00,2750      NORMALLY DEFINED                                         83
UNITDV      00,3064      NORMALLY DEFINED                                         86
UPBANK         4214      DEFINED BY EQUALS BUT NEVER REFERRED TO                 133
UPDAT1      05,2322      NORMALLY DEFINED                                        155
UPDATNN     05,2275      NORMALLY DEFINED                                        154
UPDATRET       0103      DEFINED BY EQUALS                                         7
UPDATVB     05,2315      NORMALLY DEFINED                                        155
UPLOCK         0715      NORMALLY DEFINED                                         10
UPOK        01,3234      NORMALLY DEFINED                                        132
UPRPT1      01,3217      NORMALLY DEFINED                                        132
UPRPTBB        4061      DEFINED BY EQUALS                                        16
UPRUPT      01,3205      NORMALLY DEFINED                                        132
UPTEST      01,3303      NORMALLY DEFINED                                        133


VAC1           0265      NORMALLY DEFINED                                          9
VAC1ADRC    01,3050      NORMALLY DEFINED                                        127
VAC1USE        0264      NORMALLY DEFINED                                          9
VAC2           0341      NORMALLY DEFINED                                          9
VAC2USE        0340      NORMALLY DEFINED                                          9
VAC3           0415      NORMALLY DEFINED                                          9
VAC3USE        0414      NORMALLY DEFINED                                          9
VAC4           0471      NORMALLY DEFINED                                          9
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SYMBOL    DEFINITION   HEALTH OF DEFINITION                                              PAGE

VAC4USE        0470    NORMALLY DEFINED                                                    9
VAC5           0545    NORMALLY DEFINED                                                    9
VAC5USE        0544    NORMALLY DEFINED                                                    9
VACFOUND    01,2234    NORMALLY DEFINED                                                  109
VAD            6732    NORMALLY DEFINED                                                   40
VBFANDIR    05,2133    NORMALLY DEFINED                                                  151
VBPROC      04,3266    NORMALLY DEFINED                                                  183
VBRELDSP    04,3276    NORMALLY DEFINED                                                  183
VBRQEXEC    05,3314    NORMALLY DEFINED                                                  182
VBRQWAIT    05,3340    NORMALLY DEFINED                                                  183
VBSP1LD     05,2673    NORMALLY DEFINED                                                  167
VBSP2LD     05,2674    NORMALLY DEFINED                                                  167
VBSP3LD     05,2675    NORMALLY DEFINED                                                  167
VBTERM      04,3273    NORMALLY DEFINED                                                  183
VBTSTLTS    05,3414    NORMALLY DEFINED                                                  208
VBUF           0106    NORMALLY DEFINED                                                    7
VD1            4506    NORMALLY DEFINED                                                  201
VDEF        00,3150    NORMALLY DEFINED                                                   88
VERB        04,2235    NORMALLY DEFINED                                                  143
VERBFAN     05,2116    NORMALLY DEFINED                                                  151
VERBREG        0641    NORMALLY DEFINED                                                   10
VERBTAB     05,2136    NORMALLY DEFINED                                                  151

VLOAD          6510    NORMALLY DEFINED                                                   33
VLOADCOD       7630    DEFINED BY EQUALS                                                  58
VLOAD*         6042    DEFINED BY EQUALS                                                  59
VPDVL          6576    NORMALLY DEFINED                                                   35
VPROJ          7371    NORMALLY DEFINED                                                   52
VRIGHT2     00,2222    NORMALLY DEFINED                                                   67
VROTATEX       7364    NORMALLY DEFINED                                                   51
VROUND         7116    NORMALLY DEFINED                                                   45

V/SC1          7547    NORMALLY DEFINED                                                   56
V/SC2       00,2576    NORMALLY DEFINED                                                   79
V/SC           7541    NORMALLY DEFINED                                                   56
V/SCDV      00,2675    NORMALLY DEFINED                                                   81
VSHR2       00,2041    NORMALLY DEFINED                                                   61
VSHRRND     00,2054    NORMALLY DEFINED                                                   61
VSQ         00,3164    NORMALLY DEFINED                                                   88
VSQSUB      00,3236    NORMALLY DEFINED                                                   89
VSSL        00,2126    NORMALLY DEFINED                                                   64
VSSR        00,2110    NORMALLY DEFINED                                                   63
VSTORE         6437    NORMALLY DEFINED                                                   31
VSU            6760    NORMALLY DEFINED                                                   41
VV/SC          7544    NORMALLY DEFINED                                                   56
VVXSC          7350    NORMALLY DEFINED                                                   51
VXM            7303    NORMALLY DEFINED                                                   49
VXM/MXV        7306    NORMALLY DEFINED                                                   50
VXSC           7345    NORMALLY DEFINED                                                   51
VXV            7423    NORMALLY DEFINED                                                   53
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 SYMBOL      DEFINITION    HEALTH OF DEFINITION                                            PAGE

WAIT2         01,2557     NORMALLY DEFINED                                                 119
WAITADR          0630     NORMALLY DEFINED                                                   9
WAITBANK         0625     NORMALLY DEFINED                                                   9
WAITBB           4266     NORMALLY DEFINED                                                 118
WAITEXIT         0624     NORMALLY DEFINED                                                   9
WAITLIST         4251     NORMALLY DEFINED                                                 118
WAITTEMP         0631     NORMALLY DEFINED                                                   9
WAKETEST      01,2427     NORMALLY DEFINED                                                 113
WANDCHK       10,2473     NORMALLY DEFINED                                                 233
WANDUF        10,2523     NORMALLY DEFINED                                                 234
WASKSET          1017     NORMALLY DEFINED                                                  11
WASOPSET         1022     NORMALLY DEFINED                                                  12
WDAGAIN       05,3230     NORMALLY DEFINED                                                 178
WDCNT            0123     DEFINED BY EQUALS                                                  8
WDRET            0101     DEFINED BY EQUALS                                                  7

WKSEARCH         4636     NORMALLY DEFINED                                                 206
WORCHK        10,2607     NORMALLY DEFINED                                                 235
WOROV         10,2642     NORMALLY DEFINED                                                 236
WRDRET           0101     DEFINED BY EQUALS BUT NEVER REFERRED TO                            7

WTABORT       01,2663     NORMALLY DEFINED                                                 121
WTLST2        01,2664     NORMALLY DEFINED                                                 122
WTLST4        01,2603     NORMALLY DEFINED                                                 120
WTLST5        01,2625     NORMALLY DEFINED                                                 121


X1               0046     DEFINED BY EQUALS                                                  6
X2               0047     DEFINED BY EQUALS                                                  6

XAD2          01,2035     NORMALLY DEFINED                                                  99
XAD           01,2032     NORMALLY DEFINED                                                  99
XCHX          01,2024     NORMALLY DEFINED                                                  98

XREG             0643     NORMALLY DEFINED                                                  10
XREGLP           0646     NORMALLY DEFINED                                                  10

XSTORE        01,2002     NORMALLY DEFINED                                                  98
XSU           01,2043     NORMALLY DEFINED                                                  99
XTRANDX       10,2732     NORMALLY DEFINED                                                 237


YREG             0644     NORMALLY DEFINED                                                  10
YREGLP           0647     NORMALLY DEFINED                                                  10


Z                0005     DEFINED BY EQUALS                                                  5

ZERO             7653     NORMALLY DEFINED                                                  58
ZEROANS       00,3315     NORMALLY DEFINED                                                  90
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 SYMBOL     DEFINITION   HEALTH OF DEFINITION                                              PAGE

ZREG             0645    NORMALLY DEFINED                                                    10
ZREGLP           0650    NORMALLY DEFINED                                                    10
ZRUPT            0015    DEFINED BY EQUALS BUT NEVER REFERRED TO                              5
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SUMMARY OF SYMBOL TABLE ANALYSIS

           30  DEFINED BY EQUALS BUT NEVER REFERRED TO

          113  DEFINED BY EQUALS

         1047  NORMALLY DEFINED
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 TOTAL:  1190
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MEMORY TYPE & AVAILABILITY DISPLAY

   0000  TO     0057    SPECIAL OR NONEXISTENT MEMORY       01,3125  TO  01,3305    RESERVED FIXED MEMORY
   0060  TO     0066    AVAILABLE ERASABLE MEMORY                        01,3306    AVAILABLE FIXED MEMORY
                0067    RESERVED ERASABLE MEMORY            01,3307  TO  01,3312    RESERVED FIXED MEMORY
   0070  TO     0077    AVAILABLE ERASABLE MEMORY           01,3313  TO  01,3777    AVAILABLE FIXED MEMORY

   0100  TO     0771    RESERVED ERASABLE MEMORY            02,2000  TO  03,3777    SPECIAL OR NONEXISTENT MEMORY
   0772  TO     0777    AVAILABLE ERASABLE MEMORY           04,2000  TO  04,2227    RESERVED FIXED MEMORY
   1000  TO     1047    RESERVED ERASABLE MEMORY                         04,2230    AVAILABLE FIXED MEMORY
   1050  TO     1377    AVAILABLE ERASABLE MEMORY           04,2231  TO  04,2450    RESERVED FIXED MEMORY

E3,1400  TO  E3,1420    RESERVED ERASABLE MEMORY                         04,2451    AVAILABLE FIXED MEMORY
E3,1421  TO  E7,1777    AVAILABLE ERASABLE MEMORY           04,2452  TO  04,2560    RESERVED FIXED MEMORY
   4000  TO     4044    RESERVED FIXED MEMORY                            04,2561    AVAILABLE FIXED MEMORY
   4045  TO     4047    AVAILABLE FIXED MEMORY              04,2562  TO  04,2725    RESERVED FIXED MEMORY

                4050    RESERVED FIXED MEMORY                            04,2726    AVAILABLE FIXED MEMORY
   4051  TO     4053    AVAILABLE FIXED MEMORY              04,2727  TO  04,3207    RESERVED FIXED MEMORY
   4054  TO     5017    RESERVED FIXED MEMORY                            04,3210    AVAILABLE FIXED MEMORY
   5020  TO     5777    AVAILABLE FIXED MEMORY              04,3211  TO  04,3315    RESERVED FIXED MEMORY

   6000  TO     7662    RESERVED FIXED MEMORY                            04,3316    AVAILABLE FIXED MEMORY
   7663  TO     7777    AVAILABLE FIXED MEMORY              04,3317  TO  04,3333    RESERVED FIXED MEMORY
00,2000  TO  00,3641    RESERVED FIXED MEMORY                            04,3334    AVAILABLE FIXED MEMORY
00,3642  TO  00,3777    AVAILABLE FIXED MEMORY              04,3335  TO  04,3352    RESERVED FIXED MEMORY

01,2000  TO  01,2210    RESERVED FIXED MEMORY                            04,3353    AVAILABLE FIXED MEMORY
01,2211  TO  01,2212    AVAILABLE FIXED MEMORY              04,3354  TO  04,3515    RESERVED FIXED MEMORY
01,2213  TO  01,2266    RESERVED FIXED MEMORY               04,3516  TO  04,3777    AVAILABLE FIXED MEMORY
01,2267  TO  01,2270    AVAILABLE FIXED MEMORY              05,2000  TO  05,2414    RESERVED FIXED MEMORY

01,2271  TO  01,2476    RESERVED FIXED MEMORY                            05,2415    AVAILABLE FIXED MEMORY
             01,2477    AVAILABLE FIXED MEMORY              05,2416  TO  05,3115    RESERVED FIXED MEMORY
01,2500  TO  01,2512    RESERVED FIXED MEMORY                            05,3116    AVAILABLE FIXED MEMORY
             01,2513    AVAILABLE FIXED MEMORY              05,3117  TO  05,3476    RESERVED FIXED MEMORY

01,2514  TO  01,2516    RESERVED FIXED MEMORY               05,3477  TO  05,3777    AVAILABLE FIXED MEMORY
             01,2517    AVAILABLE FIXED MEMORY              06,2000  TO  06,2444    RESERVED FIXED MEMORY
01,2520  TO  01,2522    RESERVED FIXED MEMORY               06,2445  TO  06,3777    AVAILABLE FIXED MEMORY
             01,2523    AVAILABLE FIXED MEMORY              07,2000  TO  07,3163    RESERVED FIXED MEMORY

01,2524  TO  01,2525    RESERVED FIXED MEMORY               07,3164  TO  07,3777    AVAILABLE FIXED MEMORY
01,2526  TO  01,2527    AVAILABLE FIXED MEMORY              10,2000  TO  10,3274    RESERVED FIXED MEMORY
01,2530  TO  01,3123    RESERVED FIXED MEMORY               10,3275  TO  27,3777    AVAILABLE FIXED MEMORY
             01,3124    AVAILABLE FIXED MEMORY
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OCCUPIED LOCATIONS PAGE    OCCUPIED LOCATIONS PAGE      OCCUPIED LOCATIONS PAGE      OCCUPIED LOCATIONS PAGE

4000  TO  4044   15       6430  TO     6453   31                   00,2402   71    01,2406  TO  01,2453  113
          4050   16       6454  TO     6463   32      00,2403  TO  00,2443   72    01,2454  TO  01,2464  114
4054  TO  4062   16       6464  TO     6525   33      00,2444  TO  00,2461   73    01,2465  TO  01,2476  115
4063  TO  4111  105       6526  TO     6561   34      00,2462  TO  00,2511   74    01,2500  TO  01,2512  115

4112  TO  4130  106       6562  TO     6627   35      00,2512  TO  00,2531   75    01,2514  TO  01,2516  115
4131  TO  4163  107                    6630   36      00,2532  TO  00,2546   76    01,2520  TO  01,2522  115
4164  TO  4214  108       6631  TO     6660   37      00,2547  TO  00,2563   77                 01,2524  115
4215  TO  4250  117       6661  TO     6707   38      00,2564  TO  00,2575   78                 01,2525  116

4251  TO  4271  118       6710  TO     6731   39      00,2576  TO  00,2636   79    01,2530  TO  01,2556  116
4272  TO  4332  123       6732  TO     6757   40      00,2637  TO  00,2674   80    01,2557  TO  01,2602  119
4333  TO  4346  128       6760  TO     7007   41      00,2675  TO  00,2724   81    01,2603  TO  01,2624  120
4347  TO  4355  176       7010  TO     7046   42      00,2725  TO  00,2747   82    01,2625  TO  01,2663  121

4356  TO  4371  186       7047  TO     7061   43      00,2750  TO  00,3004   83    01,2664  TO  01,2676  122
4372  TO  4377  187       7062  TO     7114   44      00,3005  TO  00,3043   84    01,2677  TO  01,2743  124
4400  TO  4420  188       7115  TO     7131   45      00,3044  TO  00,3063   85    01,2744  TO  01,3020  125
4421  TO  4427  189       7132  TO     7172   46      00,3064  TO  00,3106   86    01,3021  TO  01,3026  126

4430  TO  4457  200       7173  TO     7225   47      00,3107  TO  00,3147   87    01,3027  TO  01,3051  127
4460  TO  4520  201       7226  TO     7274   48      00,3150  TO  00,3216   88    01,3052  TO  01,3075  128
4521  TO  4552  202       7275  TO     7305   49      00,3217  TO  00,3261   89    01,3076  TO  01,3103  129
4553  TO  4567  204       7306  TO     7344   50      00,3262  TO  00,3321   90    01,3104  TO  01,3123  130

4570  TO  4607  205       7345  TO     7370   51      00,3322  TO  00,3367   91    01,3125  TO  01,3152  130
4610  TO  4661  206       7371  TO     7422   52      00,3370  TO  00,3430   92    01,3153  TO  01,3204  131
          4662  207       7423  TO     7461   53      00,3431  TO  00,3464   93    01,3205  TO  01,3263  132
4663  TO  4737  210       7462  TO     7506   54      00,3465  TO  00,3521   94    01,3264  TO  01,3305  133

4740  TO  5006  211       7507  TO     7540   55      00,3522  TO  00,3563   95    01,3307  TO  01,3312  133
5007  TO  5017  212       7541  TO     7571   56      00,3564  TO  00,3625   96    04,2000  TO  04,2050  140
6000  TO  6012   17       7572  TO     7624   57      00,3626  TO  00,3641   97    04,2051  TO  04,2117  141
6013  TO  6035   18       7625  TO     7660   58      01,2000  TO  01,2031   98    04,2120  TO  04,2200  142

6036  TO  6047   19       7661  TO     7662   59      01,2032  TO  01,2066   99    04,2201  TO  04,2227  143
6050  TO  6070   20    00,2000  TO  00,2013   60      01,2067  TO  01,2106  100    04,2231  TO  04,2247  143
6071  TO  6134   21    00,2014  TO  00,2061   61      01,2107  TO  01,2134  101    04,2250  TO  04,2323  144
6135  TO  6166   22    00,2062  TO  00,2101   62      01,2135  TO  01,2151  102    04,2324  TO  04,2371  145

6167  TO  6216   23    00,2102  TO  00,2124   63      01,2152  TO  01,2173  103    04,2372  TO  04,2432  146
6217  TO  6234   24    00,2125  TO  00,2152   64      01,2174  TO  01,2210  104    04,2433  TO  04,2450  147
6235  TO  6274   25    00,2153  TO  00,2173   65      01,2213  TO  01,2217  104    04,2452  TO  04,2505  147
6275  TO  6314   26    00,2174  TO  00,2215   66      01,2220  TO  01,2251  109    04,2506  TO  04,2532  148

6315  TO  6333   27    00,2216  TO  00,2256   67      01,2252  TO  01,2266  110    04,2533  TO  04,2560  161
6334  TO  6350   28    00,2257  TO  00,2311   68      01,2271  TO  01,2314  110                 04,2562  161
6351  TO  6412   29    00,2312  TO  00,2331   69      01,2315  TO  01,2367  111    04,2563  TO  04,2631  162
6413  TO  6427   30    00,2332  TO  00,2401   70      01,2370  TO  01,2405  112    04,2632  TO  04,2665  163
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OCCUPIED LOCATIONS  PAGE         OCCUPIED LOCATIONS  PAGE         OCCUPIED LOCATIONS  PAGE         OCCUPIED LOCATIONS  PAGE

04,2666  TO 04,2700  164         05,2034  TO 05,2112  150         05,3267  TO 05,3301  181         07,2556  TO 07,2631  221
04,2701  TO 04,2720  170         05,2113  TO 05,2170  151         05,3302  TO 05,3337  182         07,2632  TO 07,2705  222
04,2721  TO 04,2725  171         05,2171  TO 05,2175  152         05,3340  TO 05,3343  183         07,2706  TO 07,2756  223
04,2727  TO 04,2773  171         05,2176  TO 05,2240  153         05,3344  TO 05,3402  187         07,2757  TO 07,3034  224

04,2774  TO 04,3043  172         05,2241  TO 05,2311  154         05,3403  TO 05,3413  189         07,3035  TO 07,3112  225
04,3044  TO 04,3056  173         05,2312  TO 05,2325  155         05,3414  TO 05,3455  208         07,3113  TO 07,3163  226
04,3057  TO 04,3132  177         05,2326  TO 05,2402  158         05,3456  TO 05,3476  209                     10,2000  226
04,3133  TO 04,3156  178         05,2403  TO 05,2414  159         06,2000  TO 06,2036  193         10,2001  TO 10,2054  227

04,3157  TO 04,3174  179         05,2416  TO 05,2452  159         06,2037  TO 06,2107  194         10,2055  TO 10,2133  228
04,3175  TO 04,3207  180         05,2453  TO 05,2524  160         06,2110  TO 06,2162  195         10,2134  TO 10,2207  229
04,3211  TO 04,3245  180         05,2525  TO 05,2534  161         06,2163  TO 06,2242  196         10,2210  TO 10,2265  230
04,3246  TO 04,3265  181         05,2535  TO 05,2604  165         06,2243  TO 06,2315  197         10,2266  TO 10,2344  231

04,3266  TO 04,3311  183         05,2605  TO 05,2662  166         06,2316  TO 06,2372  198         10,2345  TO 10,2415  232
04,3312  TO 04,3315  184         05,2663  TO 05,2733  167         06,2373  TO 06,2444  199         10,2416  TO 10,2473  233
04,3317  TO 04,3333  184         05,2734  TO 05,3006  168         07,2000  TO 07,2041  212         10,2474  TO 10,2553  234
04,3335  TO 04,3352  184         05,3007  TO 05,3052  169         07,2042  TO 07,2114  213         10,2554  TO 10,2633  235

04,3354  TO 04,3372  184         05,3053  TO 05,3076  170         07,2115  TO 07,2165  214         10,2634  TO 10,2713  236
04,3373  TO 04,3377  185         05,3077  TO 05,3115  174         07,2166  TO 07,2235  215         10,2714  TO 10,2763  237
04,3400  TO 04,3413  189         05,3117  TO 05,3130  174         07,2236  TO 07,2311  216         10,2764  TO 10,3041  238
04,3414  TO 04,3431  190         05,3131  TO 05,3176  175         07,2312  TO 07,2361  217         10,3042  TO 10,3113  239

04,3432  TO 04,3453  204         05,3177  TO 05,3221  176         07,2362  TO 07,2441  218         10,3114  TO 10,3166  240
04,3454  TO 04,3475  205         05,3222  TO 05,3245  178         07,2442  TO 07,2503  219         10,3167  TO 10,3241  241
04,3476  TO 04,3515  207         05,3246  TO 05,3266  179         07,2504  TO 07,2555  220         10,3242  TO 10,3274  242
05,2000  TO 05,2033  149
```

```
PARAGRAPHS GENERATED FOR THIS PROGRAM, ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH.

   4000  TO     4377     PARAGRAPH # 010         ROPE MODULE 1, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
   4400  TO     4777     PARAGRAPH # 011         ROPE MODULE 1, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
   5000  TO     5377     PARAGRAPH # 012         ROPE MODULE 1, SIDE A, SENSE LINE SET 06 (WIRES 81-96)

   6000  TO     6377     PARAGRAPH # 014         ROPE MODULE 1, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
   6400  TO     6777     PARAGRAPH # 015         ROPE MODULE 1, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
   7000  TO     7377     PARAGRAPH # 016         ROPE MODULE 1, SIDE A, SENSE LINE SET 08 (WIRES 113-128)
   7400  TO     7777     PARAGRAPH # 017         ROPE MODULE 1, SIDE B, SENSE LINE SET 08 (WIRES 113-128)

00,2000  TO 00,2377     PARAGRAPH # 020         ROPE MODULE 1, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
00,2400  TO 00,2777     PARAGRAPH # 021         ROPE MODULE 1, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
00,3000  TO 00,3377     PARAGRAPH # 022         ROPE MODULE 1, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
00,3400  TO 00,3777     PARAGRAPH # 023         ROPE MODULE 1, SIDE B, SENSE LINE SET 02 (WIRES 17-32)

01,2000  TO 01,2377     PARAGRAPH # 024         ROPE MODULE 1, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
01,2400  TO 01,2777     PARAGRAPH # 025         ROPE MODULE 1, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
01,3000  TO 01,3377     PARAGRAPH # 026         ROPE MODULE 1, SIDE A, SENSE LINE SET 04 (WIRES 49-64)

04,2000  TO 04,2377     PARAGRAPH # 040         ROPE MODULE 1, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
04,2400  TO 04,2777     PARAGRAPH # 041         ROPE MODULE 1, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
04,3000  TO 04,3377     PARAGRAPH # 042         ROPE MODULE 1, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
04,3400  TO 04,3777     PARAGRAPH # 043         ROPE MODULE 1, SIDE B, SENSE LINE SET 10 (WIRES 145-160)

05,2000  TO 05,2377     PARAGRAPH # 044         ROPE MODULE 1, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
05,2400  TO 05,2777     PARAGRAPH # 045         ROPE MODULE 1, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
05,3000  TO 05,3377     PARAGRAPH # 046         ROPE MODULE 1, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
05,3400  TO 05,3777     PARAGRAPH # 047         ROPE MODULE 1, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

06,2000  TO 06,2377     PARAGRAPH # 050         ROPE MODULE 2, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
06,2400  TO 06,2777     PARAGRAPH # 051         ROPE MODULE 2, SIDE B, SENSE LINE SET 01 (WIRES 1-16)

07,2000  TO 07,2377     PARAGRAPH # 054         ROPE MODULE 2, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
07,2400  TO 07,2777     PARAGRAPH # 055         ROPE MODULE 2, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
07,3000  TO 07,3377     PARAGRAPH # 056         ROPE MODULE 2, SIDE A, SENSE LINE SET 04 (WIRES 49-64)

10,2000  TO 10,2377     PARAGRAPH # 060         ROPE MODULE 2, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
10,2400  TO 10,2777     PARAGRAPH # 061         ROPE MODULE 2, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
10,3000  TO 10,3377     PARAGRAPH # 062         ROPE MODULE 2, SIDE A, SENSE LINE SET 06 (WIRES 81-96)
```

OCTAL LISTING OF PARAGRAPH # 010, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
 4000        00004 0      34054 1      56006 1      12721 0      52011 0      34055 0      56006 1      14330 1
 4010        52011 0      34056 0      56006 1      14330 1      52011 0      34057 1      56006 1      14272 0
 4020        52011 0      34060 0      56006 1      13052 1      52011 0      34061 1      56006 1      13153 1
 4030        52011 0      34061 1      56006 1      13175 0      52011 0      34061 1      56006 1      13205 1

 4040        52011 0      34062 1      56006 1      14330 1      50017 1        @            @            @
 4050        50017 1        @            @            @       C: 02003 0   C: 04000 0   C: 04000 0   C: 04003 0
 4060     C: 02002 1   C: 02001 1   C: 04000 0      52120 0      50002 0      30000 1      24002 0      54001 1
 4070        22004 0      76425 0      56002 0      52120 0      50002 0      02000 0      56120 1      56004 0

 4100        56120 1      00117 0      56002 0      50000 1      30000 1      54004 1      76425 0      56002 0
 4110        50002 0      12000 1      36425 1      70117 1      60120 1      00002 0      54001 1      22004 0
 4120        22121 0      76425 0      00006 1      50000 1      32001 1      56121 0      54004 1      30121 0
 4130        00002 0      54632 1      00006 1      50002 0      30001 0      52634 1      34214 1      56004 0

 4140        54626 1      12241 0      54632 1      00006 1      50002 0      30001 0      52634 1      34214 1
 4150        56004 0      14220 1      34214 1      54001 1      30002 0      22006 1      00004 0      12316 0
 4160        34214 1      54001 1      40150 1      14155 0      54150 1      34214 1      54004 1      12375 0
 4170        54633 0      47645 0      26002 1      34214 1      56004 0      12406 0      00004 0      54632 1

 4200        34214 1      56006 1      54151 0      30002 0      12454 1      34214 1      54004 1      12465 0
 4210        30626 0      54004 1      50002 0      00002 0   C: 02220 0      47653 1      54067 1      00003 1
 4220        47645 0      00006 1      03011 1      14226 1      00006 1      23043 1      10067 1      14241 0
 4230        37645 1      14235 0      34250 1      54004 1      01043 1      00006 1      05011 1      52151 0

 4240        52006 0      37645 1      00006 1      05011 1      34214 1      54004 1      00004 0      12315 0
 4250     C: 21271 0      56002 0      54624 0      00006 1      50000 1      30001 0      54630 0      34266 1
 4260        56006 1      12557 0      30625 0      54006 0      50624 1      00002 0   C: 02003 0   C: 73506 0
 4270     C: 73774 1      14321 1      54016 1      00006 1      22012 1      37627 0      57404 0      57403 1

 4300        57402 0      57401 0      57400 1      67626 1      26026 1      54636 0      47653 1      54636 0
 4310        00006 1      44270 1      53420 1      53416 1      53414 0      53412 0      53410 1      53406 0
 4320        52006 0      10636 0      34266 1      54006 0      14275 1      00006 1      22012 1      30016 0
 4330        54006 0      52011 0      50017 1   C: 04025 1   C: 10003 0   C: 14031 0   C: 20033 0   C: 24017 1

 4340     C: 30036 1   C: 34034 1   C: 40023 1   C: 44035 1   C: 50037 0   C: 54000 0   C: 60000 1      34355 0
 4350        70660 0      54107 0      04372 0      04354 1      04205 1   C: 07700 1      54107 0      10652 1
 4360        00002 0      30002 0      67646 1      54700 1      04400 1      34371 0      56006 1      54701 0
 4370        02000 0   C: 12001 0      30002 0      67646 1      54700 1      04365 0      52701 0      52006 0
```

```
OCTAL LISTING OF PARAGRAPH # 011, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

 4400          47630 1      00004 0      70661 1      67630 0      54661 1      00003 1      00002 0      37646 1
 4410          54652 1      22004 0      56002 0      52120 0      04112 1      54676 1      04164 0      04205 1
 4420          10654 1      14426 1      14407 1      00002 0      50002 0      00002 0      50002 0      00001 0
 4430          54657 1      54003 0      74504 0      64505 0      54131 0      00002 0      30657 0      14431 1

 4440          54003 0      74504 0      64505 0      00002 0   C: 00016 0   C: 00011 1   C: 00004 0      54020 1
 4450          40020 1      40020 1      40020 1      40020 1      56020 0      00002 0      54022 0      40022 0
 4460          40022 0      40022 0      40022 0      56022 1      00002 0      60000 1      60000 1      60000 1
 4470          60000 1      60000 1      00002 0   C: 00037 0   C: 01740 0   C: 76000 0      04131 0      04251 0

 4500          04321 0      04142 1   C: 30000 1   C: 03777 0   C: 00377 1   C: 01400 1   C: 00023 0   C: 00021 1
 4510       C: 00025 0   C: 00012 1      37640 1      00006 1      05011 1      00002 0      47640 0      00006 1
 4520          03011 1      00002 0      37642 0      00006 1      05011 1      00002 0      00006 1      30025 0
 4530          52755 1      00002 0      00006 1      30142 0      20142 1      60140 1      26140 0      54007 1

 4540          00002 0      54105 1      00002 0      37641 0      00006 1      05011 1      00002 0      47641 1
 4550          00006 1      05011 1      00002 0      10677 0      00002 0      37646 1      54677 0      50002 0
 4560          00001 0      36425 1      70002 1      60004 0      04102 0   C: 10000 0      10677 0      14561 0
 4570          37646 1      54677 0      00002 0      44600 1      60002 0      60004 0      04102 0   C: 10001 1

 4600       C: 02003 0      54107 0      10652 1      14606 1      30002 0      14363 1      24002 0      14573 0
 4610          56002 0      54130 1      37655 0      60677 1      00006 1      64623 1      04636 0      04623 1
 4620          04170 0      37646 1      54677 0      00004 0      47642 1      00006 1      03011 1      37653 0
 4630          54652 1      00003 1      00130 0      56002 0      54130 1      04623 1      37653 0      56702 1

 4640          56703 0      56704 1      00006 1      14647 1      00004 0      50002 0      00001 0      00002 0
 4650          56002 0      54130 1      00004 0      34661 1      04251 0   C: 03476 1   C: 10001 1      00003 1
 4660          00130 0   C: 01750 1      04662 1   C: 01034 1   C: 01035 0   C: 01036 0   C: 02411 1   C: 02417 1
 4670       C: 04725 0   C: 02473 0   C: 00001 0   C: 00002 0   C: 00004 0   C: 00010 0   C: 00020 0   C: 00040 0

 4700       C: 00100 0   C: 00200 0   C: 00400 0   C: 01000 0   C: 02000 0   C: 04000 0   C: 10000 0   C: 20000 0
 4710       C: 40000 0   C: 00000 1   C: 00001 0   C: 00002 0   C: 00003 1   C: 00004 0   C: 00005 1   C: 00006 1
 4720       C: 00007 0   C: 00077 1   C: 00177 0   C: 17777 0   C: 25252 0   C: 37777 1   C: 40000 0   C: 40400 1
 4730       C: 52500 0   C: 52525 1   C: 52552 1   C: 57761 0   C: 77725 1   C: 77760 0   C: 77761 1   C: 77770 1

 4740       C: 77771 0   C: 77772 0   C: 77773 1   C: 77774 0   C: 77775 1   C: 77776 1   C: 77777 0   C: 14000 1
 4750       C: 37776 0   C: 04712 1   C: 04747 1      40000 0      10000 0      14770 1      14770 1      14770 1
 4760          00002 0      40000 0      10000 0      14770 1      14770 1      10000 0      14770 1      00002 0
 4770          56002 0      50044 1      25045 1      00004 0      44727 0      70675 1      64727 1      54675 1
```

OCTAL LISTING OF PARAGRAPH # 012, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
 5000       00003 1     31047 0     00006 1     65005 1     05010 0     34711 1     55047 1     04224 1
 5010       11047 1     05014 1     05007 0     05014 1     04224 1     35017 1     04105 1  C: 16003 0
 5020          @           @           @           @           @           @           @           @
 5030          @           @           @           @           @           @           @           @

 5040          @           @           @           @           @           @           @           @
 5050          @           @           @           @           @           @           @           @
 5060          @           @           @           @           @           @           @           @
 5070          @           @           @           @           @           @           @           @

 5100          @           @           @           @           @           @           @           @
 5110          @           @           @           @           @           @           @           @
 5120          @           @           @           @           @           @           @           @
 5130          @           @           @           @           @           @           @           @

 5140          @           @           @           @           @           @           @           @
 5150          @           @           @           @           @           @           @           @
 5160          @           @           @           @           @           @           @           @
 5170          @           @           @           @           @           @           @           @

 5200          @           @           @           @           @           @           @           @
 5210          @           @           @           @           @           @           @           @
 5220          @           @           @           @           @           @           @           @
 5230          @           @           @           @           @           @           @           @

 5240          @           @           @           @           @           @           @           @
 5250          @           @           @           @           @           @           @           @
 5260          @           @           @           @           @           @           @           @
 5270          @           @           @           @           @           @           @           @

 5300          @           @           @           @           @           @           @           @
 5310          @           @           @           @           @           @           @           @
 5320          @           @           @           @           @           @           @           @
 5330          @           @           @           @           @           @           @           @

 5340          @           @           @           @           @           @           @           @
 5350          @           @           @           @           @           @           @           @
 5360          @           @           @           @           @           @           @           @
 5370          @           @           @           @           @           @           @           @
```

```
OCTAL LISTING OF PARAGRAPH # 014, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

 6000      00006 1      22150 0      30004 0      54151 0      77630 1      54101 0      66425 1      54100 1
 6010      16023 1      24006 1      16017 0      54147 1      30151 1      54004 1      10023 1      16032 1
 6020      10067 1      14160 0      24150 0      50150 0      30000 1      10000 0      16341 0   C: 00177 0
 6030      54023 1      76027 0      54020 1      10020 1      16167 0      16730 1      77646 0      10000 0

 6040      16073 1      50150 0      40001 1      10000 0      16135 1   C: 77773 1      24150 0      54102 0
 6050      66171 0      10000 0      66234 1      16060 0      30104 1      26102 0      50020 0      76234 0
 6060      00006 1      66056 1      60100 0      54004 1      76425 0      67634 1      54102 0      50020 0
 6070      76234 0      37661 1      54020 1      30104 1      54114 1      24150 0      50150 0      40000 0

 6100      10000 0      24114 0      16103 1      54102 0      76232 0      00006 1      16111 1      30101 1
 6110      26102 0      50114 0      40046 1      26102 0      76231 0      00006 1      16131 0      76232 0
 6120      00006 1      16133 1      30102 1      54004 1      76425 0      67634 1      54102 0      50020 0
 6130      36234 1      30104 1      26102 0      50020 0      36234 1      36227 0      70020 1      66142 0

 6140      10000 0      16153 1   C: 77767 1      66045 0      10000 0      50000 1      46164 0      16155 1
 6150      50147 0      46162 0      16155 1      50147 0      46164 0      26152 0      54102 0      50020 0
 6160      76234 0   C: 00002 0   C: 00006 1   C: 00006 1   C: 00002 0   C: 00003 1   C: 00006 1      10020 1
 6170      16217 1   C: 77722 0      24150 0      50150 0      30000 1      54103 1      54102 0      76231 0

 6200      10000 0      16203 1      16210 0      36230 0      54004 1      70020 1      50000 1      16275 0
 6210      30104 1      26102 0      36230 0      54004 1      70020 1      50000 1      16275 0      54004 1
 6220      10020 1      50000 1      16315 1      10147 1      12000 1      12000 1      12102 1   C: 00023 0
 6230   C: 02177 1   C: 77700 0   C: 76000 0   C: 36000 1   C: 76056 0      16510 1      17047 1      17572 1

 6240      17345 0      16671 0      16473 0      16464 0      17541 1      16504 1      16623 1      16526 1
 6250      17300 1      16562 1      16631 1      17303 1      17533 1      17511 1      17514 1      17520 0
 6260      17536 1      16732 0      16760 1      17010 0      17275 1      17423 1      17371 1      16776 0
 6270      17034 0      16750 1      16272 1      17507 0      17530 1      12000 1      12005 1      12010 0

 6300      12014 1      12020 0      12024 1      12040 0      12047 1      12032 0      12043 0      12107 1
 6310      12114 0      12127 0      12067 0      12135 0      12077 1      13125 0      13442 1      13431 0
 6320      13522 0      13524 0      13107 0      13111 1      17605 1      13150 1      12750 0      13114 1
 6330      13164 0      16334 1      13214 1      13167 0      30151 1      54004 1      24150 0      50150 0

 6340      40000 0      54102 0      76425 0      56102 1      76233 1      00006 1      77641 1      50000 1
 6350      16351 1      06421 0      16022 0      06413 1      16022 0      06416 1      16022 0      06421 0
 6360      16454 0      06413 1      16454 0      06416 1      16454 0      06421 0      16071 0      06413 1
 6370      16071 0      06416 1      16071 0      06421 0      16457 0      06413 1      16457 0      06416 1
```

OCTAL LISTING OF PARAGRAPH # 015, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
 6400      16457 0     06421 0     16462 0     06413 1     16462 0     06416 1     16462 0     06421 0
 6410      37657 1     54020 1     16172 1     50104 1     40046 1     16420 0     50104 1     40047 0
 6420      26102 0     30102 1     66171 0     10000 0     16430 1  C: 01777 1     30104 1     26102 0
 6430      00006 1     30141 0     50102 1     52001 1     10147 1     16450 1     00002 0     00006 1

 6440      30144 0     50102 1     52003 0     00006 1     30146 1     50102 1     52005 0     00002 0
 6450      30142 0     50102 1     54002 1     00002 0     37660 0     54020 1     16041 0     37630 0
 6460      54020 1     16041 0     36042 1     16072 0     00006 1     50102 1     30001 0     52141 1
 6470      37653 0     54142 1     16013 1     50102 1     30002 0     54142 1     00006 1     50102 1

 6500      30001 0     52141 1     37646 1     16013 1     22007 0     50102 1     30000 1     16467 0
 6510      00006 1     50102 1     30001 0     52141 1     00006 1     50102 1     30003 1     52144 1
 6520      00006 1     50102 1     30005 1     52146 0     47646 0     16013 1     00006 1     50102 1
 6530      30001 0     52141 1     50152 1     52001 1     50147 0     36164 1     26152 0     10147 1

 6540      16555 0     16553 0     54147 1     54142 1     52144 1     50152 1     51775 0     52146 0
 6550      50152 1     51777 1     16014 0     54142 1     16014 0     54147 1     56142 0     50152 1
 6560      53777 0     16014 0     00006 1     50102 1     30001 0     52141 1     50152 1     52001 1
 6570      50147 0     36164 1     26152 0     10147 1     16613 1     16514 0     00006 1     50102 1

 6600      30003 1     52144 1     50152 1     51775 0     00006 1     50102 1     30005 1     52146 0
 6610      50152 1     51777 1     16014 0     00006 1     50102 1     30003 1     52144 1     30142 0
 6620      50152 1     53777 0     16520 1     24150 0     50150 0     30000 1     50102 1     54000 0
 6630      16014 0     24150 0     50150 0     30000 1     50102 1     60000 1     54004 1     76425 0

 6640      50000 1     32000 0     54103 1     46425 0     60150 0     60151 1     50104 1     54052 1
 6650      30103 0     54004 1     76425 0     67634 1     54150 1     10004 1     16002 1     16661 1
 6660      16002 1     40150 1     66707 1     10000 0     30104 1     26150 1     50150 0     26000 0
 6670      16651 1     50150 0     30001 0     50102 1     60000 1     54004 1     76425 0     50000 1

 6700      32000 0     16651 1     30151 1     54004 1     50150 0     30001 0     16651 1  C: 02055 0
 6710      10140 0     00002 0     16714 1     16726 0     10141 1     00002 0     16720 0     16726 0
 6720      10142 1     00002 0     16724 1     16726 0     50002 0     00001 0     50002 0     00002 0
 6730      50150 0     10001 1     00006 1     50102 1     30003 1     20144 1     00006 1     16741 1

 6740      07006 0     00006 1     50102 1     30005 1     20146 0     00006 1     16750 1     07006 0
 6750      00006 1     50102 1     30001 0     20141 1     00006 1     16014 0     07006 0     16014 0
 6760      00006 1     50102 1     40003 0     20144 1     00006 1     16767 0     07006 0     00006 1
 6770      50102 1     40005 0     20146 0     00006 1     16776 0     07006 0     00006 1     50102 1
```

```
OCTAL LISTING OF PARAGRAPH # 016, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

  7000        40001 1     20141 1     00006 1     16014 0     07006 0     16014 0     37646 1     17130 0
  7010        00006 1     50102 1     30003 1     52144 1     00006 1     40001 1     20144 1     00006 1
  7020        17022 1     07006 0     00006 1     50102 1     30005 1     52146 0     00006 1     40001 1
  7030        20146 0     00006 1     17034 0     07006 0     00006 1     50102 1     30001 0     52141 1

  7040        00006 1     40001 1     20141 1     00006 1     16014 0     07006 0     16014 0     00006 1
  7050        50102 1     30002 0     20142 1     50102 1     60000 1     60140 1     54140 0     16014 0
  7060        54105 1     16014 0     50002 0     30000 1     24002 0     54102 0     50102 1     30001 0
  7070        54142 1     37653 0     56141 0     54121 1     00006 1     70142 1     56142 0     00006 1

  7100        70140 0     20142 1     50102 1     30000 1     56121 0     00006 1     70121 1     20142 1
  7110        56140 1     00006 1     70121 1     20141 1     00002 0     37653 0     56142 0     60000 1
  7120        54001 1     00002 0     60141 0     54141 1     00002 0     60140 1     54140 0     00002 0
  7130        54105 1     00002 0     37645 1     54122 1     00006 1     22123 1     07066 0     52144 1

  7140        52141 1     52115 0     30142 0     54116 0     30122 0     26102 0     07066 0     52142 1
  7150        20116 0     60140 1     60114 0     54114 1     17156 0     54105 1     52146 0     52141 1
  7160        30122 0     26102 0     07066 0     52116 0     20142 1     60140 1     60114 0     54140 0
  7170        00123 1     54105 1     00123 1     37662 1     54102 0     50002 0     30000 1     54124 1

  7200        60000 1     60002 0     54125 0     54103 1     00006 1     50000 1     30004 0     52141 1
  7210        52107 0     17215 1     54124 1     47645 0     26103 1     07066 0     00006 1     50103 0
  7220        30002 0     20141 1     10124 1     17212 0     50125 1     00005 1     00006 1     22114 0
  7230        06710 1     17235 0     17235 0     47626 0     17236 0     37626 1     54115 0     00006 1

  7240        24000 1     60142 0     54142 1     37653 0     60115 1     60141 0     54141 1     37653 0
  7250        60115 1     60140 1     54140 0     54141 1     00114 0     54142 1     17252 1     54121 1
  7260        00006 1     70142 1     54142 1     37653 0     56141 0     00006 1     70121 1     20142 1
  7270        56140 1     00006 1     70121 1     20141 1     00002 0     07132 0     37653 0     16013 1

  7300        37645 1     54124 1     17306 1     47650 1     54124 1     36162 1     54122 1     07475 0
  7310        07134 0     00006 1     30107 1     52141 1     52120 0     00006 1     30111 0     52144 1
  7320        00006 1     30113 1     52146 0     30124 0     26102 0     07134 0     52107 0     52141 1
  7330        52111 1     52144 1     52113 0     52146 0     30124 0     26102 0     07134 0     52120 0

  7340        52141 1     52146 0     52111 1     52144 1     16014 0     10147 1     17372 1     17372 1
  7350        07066 0     07116 0     52144 1     52141 1     52144 1     07066 0     07116 0     52146 0
  7360        52141 1     52146 0     07066 0     07116 0     52141 1     52146 0     52144 1     52141 1
  7370        16014 0     07132 0     00006 1     30141 0     52144 1     07066 0     07116 0     37645 1
```

OCTAL LISTING OF PARAGRAPH # 017, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
 7400        26102 0     00006 1     30144 0     52141 1     52146 0     07066 0     07116 0     37645 1
 7410        26102 0     52144 1     52141 1     52144 1     07066 0     07116 0     52141 1     52146 0
 7420        52141 1     47646 0     16013 1     00006 1     30146 1     52141 1     52107 0     07066 0
 7430        00006 1     40144 1     52141 1     52111 1     07066 0     37645 1     26102 0     00006 1

 7440        40146 0     52141 1     52146 0     07066 0     00006 1     30107 1     52141 1     52113 0
 7450        07066 0     37645 1     26102 0     00006 1     40107 0     52141 1     20146 0     00006 1
 7460        17462 1     07006 0     07066 0     52111 1     52144 1     52141 1     20144 1     00006 1
 7470        17472 0     07006 0     07066 0     52113 0     16753 1     00006 1     30141 0     52107 0

 7500        00006 1     30144 0     52111 1     00006 1     30146 1     52113 0     00002 0     07066 0
 7510        16014 0     07066 0     07115 0     16014 0     00006 1     50102 1     30001 0     17524 1
 7520        00006 1     50102 1     30001 0     52141 1     52115 0     37653 0     54004 1     12332 0
 7530        30102 1     54152 0     16014 0     37653 0     54004 1     12153 0     36027 1     54004 1

 7540        12174 0     10147 1     17553 1     17553 1     00006 1     50102 1     30001 0     52115 0
 7550        37653 0     54004 1     12576 0     00006 1     50102 1     30003 1     52144 1     00006 1
 7560        50102 1     30005 1     52146 0     47646 0     54147 1     00006 1     50102 1     30001 0
 7570        52141 1     10547 1     50102 1     10000 0     16014 0     17577 1     17605 1     50102 1

 7600        10001 1     16014 0     16014 0     17605 1     16014 0     00006 1     40141 1     52141 1
 7610        10147 1     17622 1     17622 1     00006 1     40144 1     52144 1     00006 1     40146 0
 7620        52146 0     16014 0     40142 1     54142 1     16014 0  C: 37777 1  C: 37777 1  C: 57777 1
 7630     C: 40000 0  C: 20000 0  C: 10000 0  C: 04000 0  C: 02000 0  C: 01000 0  C: 00400 0  C: 00200 0

 7640     C: 00100 0  C: 00040 0  C: 00020 0  C: 00010 0  C: 00004 0  C: 00002 0  C: 00001 0  C: 00013 0
 7650     C: 00012 1  C: 00011 1  C: 00007 0  C: 00000 1  C: 77777 0  C: 77776 1  C: 77775 1  C: 00031 0
 7660     C: 40014 0  C: 40015 1  C: 00106 0       @           @           @           @           @
 7670          @           @           @           @           @           @           @           @

 7700          @           @           @           @           @           @           @           @
 7710          @           @           @           @           @           @           @           @
 7720          @           @           @           @           @           @           @           @
 7730          @           @           @           @           @           @           @           @

 7740          @           @           @           @           @           @           @           @
 7750          @           @           @           @           @           @           @           @
 7760          @           @           @           @           @           @           @           @
 7770          @           @           @           @           @           @           @           @
```

OCTAL LISTING OF PARAGRAPH # 020, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
00,2000       36162 1     70020 1     54021 0     10020 1     12062 0  C: 00024 1     50021 1     37631 1
00,2010       54121 1     10020 1     02031 1     16014 0     30121 0     00006 1     70142 1     54142 1
00,2020       30121 0     00006 1     70140 0     52141 1     30121 0     00006 1     70001 1     20142 1
00,2030       16014 0     30142 0     00006 1     70121 1     56141 0     00006 1     70121 1     56141 0

00,2040       60001 0     60000 1     54142 1     12045 0     26141 1     37653 0     54142 1     56140 1
00,2050       00006 1     70121 1     20141 1     00002 0     30121 0     00006 1     70141 1     54141 1
00,2060       56001 0     12041 1     30021 1     54121 1     00006 1     30142 0     20142 1     60140 1
00,2070       60140 1     54140 0     12074 1     54105 1     10121 1     12063 1     10020 1     07115 0

00,2100       16014 0     16014 0     37652 1     70020 1     54121 1     10020 1     12126 1  C: 00176 1
00,2110       50121 0     37631 1     54121 1     02054 1     52141 1     52144 1     52141 1     02054 1
00,2120       52141 1     52146 0     52141 1     02054 1     17364 0     54121 1     00006 1     30141 0
00,2130       20141 1     00006 1     12134 1     07006 0     00006 1     30144 0     20144 1     00006 1

00,2140       12142 0     07006 0     00006 1     30146 1     20146 0     00006 1     12150 0     07006 0
00,2150       10121 1     12125 1     16014 0     54121 1     06710 1     12157 1     12172 0     30140 1
00,2160       12167 1     24121 0     00006 1     30142 0     20142 1     60140 1     26140 0     60000 1
00,2170       54000 0     12161 1     40121 1     16626 1     70102 0     10000 0     12204 1     37635 0

00,2200       70102 0     10000 0     07115 0     16014 0     54121 1     37637 1     00006 1     70102 0
00,2210       76165 1     50000 1     12213 1     12312 1     12321 1     12316 0     10147 1     12257 1
00,2220       12257 1     30121 0     62273 0     00006 1     62110 0     67655 0     54121 1     37653 0
00,2230       54001 1     50140 1     56141 0     02252 0     20141 1     56143 1     56144 0     02252 0

00,2240       20144 1     56145 1     56146 1     02252 0     20146 0     10121 1     12222 0     13614 0
00,2250    C: 04604 1     16014 0     60000 1     54142 1     37653 0     56001 0     00002 0     30121 0
00,2260       62273 0     00006 1     62302 1     67655 0     54121 1     37653 0     56140 1     56141 0
00,2270       54142 1     10121 1     02260 1  C: 77763 0  C: 22650 1     37635 0     70102 0     10000 0

00,2300       07115 0     16014 0     50121 0     37631 1     54121 1     37635 0     70102 0     10000 0
00,2310       12012 1     12014 1     40121 1     62107 0     54121 1     12216 1     40121 1     62107 0
00,2320       54121 1     10147 1     12325 0     12325 0     12126 1     37641 0     00006 1     70102 0
00,2330       54020 1     12064 0     47646 0     54122 1     54123 0     54124 1     10114 1     12366 1

00,2340       12342 1     12362 0     56115 1     56114 0     56141 0     56140 1     00006 1     12351 0
00,2350       12355 1     10114 1     12366 1     12355 1     12362 0     37626 1     54140 0     02552 1
00,2360       37646 1     17060 1     00006 1     40115 0     52115 0     24122 0     10140 0     12403 0
00,2370       12372 1     12377 1     10141 1     12403 0     16014 0     12377 1     16014 0     00006 1
```

OCTAL LISTING OF PARAGRAPH # 021, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
00,2400       40141 1   52141 1   24122 0   40140 0      67655 0   60114 0   10000 0   12451 1
00,2410    C: 60001 0   12412 0   37631 1   60000 1      60141 0   54141 1   37653 0   67626 1
00,2420       26140 0   37631 1   60000 1   60115 1      54115 0   37653 0   67626 1   26114 1
00,2430       40140 0   60114 0   10000 0   12451 1   C: 00117 0   12355 1   54124 1   40141 1

00,2440       60115 1   00006 1   62355 0   12451 1      00006 1   24123 1   00006 1   30115 1
00,2450       20115 0   30114 0   60000 1   54000 0      12444 0   52141 1   50123 1   02507 1
00,2460       54142 1   16014 0   22021 1   00006 1      77631 0   56001 0   60021 1   56001 0
00,2470       12513 0   20001 1   20001 1   20001 1      20001 1   20001 1   20001 1   20001 1

00,2500       20001 1   20001 1   20001 1   20001 1      20001 1   20001 1   52141 1   10124 1
00,2510    C: 06552 0   12564 0   52141 1   00006 1      10114 1   52141 1   40140 0   00006 1
00,2520       70115 0   60141 0   54000 0   12530 1      00006 1   60114 0   24140 1   12532 0
00,2530       00006 1   62542 0   00006 1   60114 0      00006 1   12540 0   00006 1   62546 1

00,2540       24140 1   12547 1   00006 1   12552 0      00006 1   26140 0   60114 0   22007 0
00,2550       00006 1   10114 1   54141 1   10122 1      00002 0   00002 0   00002 0   00006 1
00,2560       40141 1   52141 1   37653 0   00002 0      40140 0   60114 0   00006 1   12571 1
00,2570       12512 1   37626 1   54140 0   40115 0      60141 0   12546 0   47646 0   54123 0

00,2600       54113 0   10114 1   12637 0   12605 1      12633 1   56115 1   56114 0   56141 0
00,2610       56140 1   00006 1   12614 1   12355 1      56144 0   56143 1   00006 1   12621 1
00,2620       12355 1   52146 1   56145 1   00006 1      12626 0   12355 1   10114 1   12637 0
00,2630       12355 1   12633 1   12355 1   00006 1      40115 0   52115 0   24113 1   37631 1

00,2640       60000 1   60115 1   54115 0   37653 0      67626 1   26114 1   56117 0   30115 1
00,2650       54120 0   12657 0   00006 1   24123 1      00006 1   30115 1   20115 0   30114 0
00,2660       60000 1   54000 0   12652 0   02675 1      52144 1   52141 1   52144 1   02675 1
00,2670       52146 0   52141 1   52146 0   02675 1      17364 0   30113 1   54122 1   10140 0

00,2700       12714 0   12703 0   12710 1   10141 1      12714 0   00002 0   12710 1   00002 0
00,2710       00006 1   40141 1   52141 1   24122 0      47646 0   54124 1   40140 0   60117 0
00,2720       00006 1   62725 0   52141 1   50123 1      12507 0   37631 1   60000 1   60141 0
00,2730       54141 1   37653 0   67626 1   26140 0      40140 0   60117 0   10000 0   12722 0

00,2740    C: 32506 0   12355 1   54124 1   40141 1      60120 1   00006 1   62355 0   12722 0
00,2750       07475 0   03236 0   00006 1   30141 0      50104 1   52043 1   03262 1   10140 0
00,2760       12762 1   12355 1   43063 0   60121 0      10000 0   40000 0   13044 0   12776 1
00,2770       43062 1   54121 1   30140 1   54001 1      37653 0   13023 1   10121 1   13005 0
```

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OCTAL LISTING OF PARAGRAPH # 022, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

00,3000      42005 1      54121 1      00006 1      30141 0      13023 1      40000 0      54121 1      40000 0
00,3010      50000 1      37631 1      54114 1      00006 1      70141 1      56114 0      00006 1      70140 0
00,3020      56001 0      60114 0      56001 0      50104 1      52045 1      47646 0      54124 1      52107 0
00,3030      52141 1      52115 0      03064 0      52111 1      52141 1      52144 1      03064 0      52113 0

00,3040      52141 1      52146 0      03064 0      17364 0      54121 1      37653 0      56107 1      56106 0
00,3050      56111 0      56110 1      56113 1      56112 0      40121 1      50000 1      37631 1      00006 1
00,3060      70140 0      12773 1   C: 00015 0   C: 00016 0      10140 0      13103 1      13070 1      13075 1
00,3070      10141 1      13103 1      00002 0      13075 1      00002 0      47653 1      54122 1      00006 1

00,3100      40141 1      50121 0      12507 0      54122 1      52141 1      50121 0      12507 0      03217 0
00,3110      16014 0      07115 0      37653 0      16013 1      10147 1      13144 1      13144 1      03236 0
00,3120      22147 0      00006 1      30141 0      50104 1      52043 1      03262 1      10121 1      13131 0
00,3130      16014 0      62273 0      00006 1      63137 1      22007 0      22102 1      12263 0      50121 0

00,3140      37630 0      54121 1      37653 0      12017 1      06710 1      16014 0      16014 0      17605 1
00,3150      47644 1      26152 0      00006 1      50000 1      30003 1      52144 1      00006 1      50152 1
00,3160      30001 0      52146 0      47646 0      16013 1      03236 0      37653 0      16013 1      00006 1
00,3170      30141 0      50152 1      52001 1      50147 0      36164 1      26152 0      10147 1      13212 1

00,3200      16014 0      00006 1      30144 0      50152 1      51775 0      00006 1      30146 1      50152 1
00,3210      51777 1      16014 0      30142 0      16557 1      50104 1      30052 0      16651 1      30141 0
00,3220      00006 1      70000 0      54142 1      37653 0      56141 0      00006 1      70140 0      20001 1
00,3230      20142 1      50140 1      00006 1      70000 0      20141 1      00002 0      00006 1      22123 1

00,3240      03217 0      52144 1      52141 1      52115 0      30142 0      54116 0      03217 0      52142 1
00,3250      20116 0      60140 1      60114 0      54114 1      13256 1      54105 1      52146 0      52141 1
00,3260      03217 0      11163 0      37653 0      54121 1      10140 0      13322 0      13270 0      13312 0
00,3270      56142 0      56141 0      54140 0      37652 1      54121 1      10140 0      13322 0      13301 1

00,3300      13315 1      56141 0      54140 0      37652 1      26121 1      10140 0      13322 0      00002 0
00,3310      13315 1      00002 0      10000 0      13321 0      10141 1      37653 0      13365 0      13321 0
00,3320      13365 0      00321 1      62410 0      00006 1      63370 0      52141 1      22021 1      00006 1
00,3330      77631 0      52141 1      56021 1      26141 1      32274 1      00006 1      70140 0      62510 1

00,3340      54114 1      00006 1      10114 1      00006 1      77631 0      26114 1      00006 1      77631 0
00,3350      52141 1      00006 1      10114 1      54115 0      37653 0      56001 0      00006 1      10114 1
00,3360      54001 1      30115 1      20141 1      10000 0      37626 1      54140 0      54141 1      00002 0
00,3370      67632 1      00006 1      63414 0      52141 1      22021 1      00006 1      77631 0      52141 1
```

```
OCTAL LISTING OF PARAGRAPH # 023, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

00,3400        56021 1      26141 1      32740 0      00006 1      70140 0      62250 1      13340 1      00006 1
00,3410        30142 0      20142 1      60140 1      26140 0      24121 0      00006 1      30142 0      20142 1
00,3420        60140 1      26140 0      60000 1      54022 0      10022 0      10022 0      13407 0      13334 1
00,3430        13402 0      06710 1      13435 1      13440 0      13440 0      00006 1      40141 1      52141 1

00,3440        37632 1      26140 0      52141 1      20001 1      54000 0      13450 1      00006 1      40001 1
00,3450        52141 1      30140 1      60000 1      54001 1      13465 1      50000 1      37630 0      60000 1
00,3460        00006 1      60140 1      54140 0      40141 1      54141 1      00006 1      30141 0      52120 0
00,3470        03217 0      07173 0   C: 00003 1   C: 14441 0   C: 37325 1   C: 53250 0   C: 60764 1   C: 12146 1

00,3500     C: 21276 1   C: 75466 1   C: 71471 0   C: 00236 0   C: 32757 0      32434 0      07065 0      00006 1
00,3510        30142 0      20142 1      60140 1      26140 0      00006 1      30142 0      20142 1      60140 1
00,3520        26140 0      16014 0      33543 0      13525 1      33625 0      54122 1      06710 1      13537 1
00,3530        13640 1      00006 1      40141 1      52141 1      32247 1      56122 0      54123 0      47631 0

00,3540        60140 1      10000 0      13633 0      13621 0      13554 1      10141 1      37653 0      13551 1
00,3550        13554 1      54141 1      54140 0      00122 0      00006 1      40141 1      67631 1      52141 1
00,3560        52120 0      03262 1      10121 1      13626 1      52141 1      52120 0      52141 1      07173 0
00,3570     C: 00006 1   C: 13240 0   C: 23630 0   C: 74721 0   C: 47775 1   C: 02440 0   C: 20237 0   C: 75067 1

00,3600     C: 70742 1   C: 03436 0   C: 26756 1   C: 74037 0   C: 57640 1   C: 03046 0   C: 07143 0   C: 76654 1
00,3610     C: 42244 0      32434 0      07065 0      00122 0      00006 1      40141 1      67631 1      52141 1
00,3620        00123 1      00006 1      40141 1      67632 1      52141 1      16014 0      50000 1      37631 1
00,3630        54121 1      02054 1      13564 1      10000 0      13636 0      13551 1      13551 1      03637 0

00,3640        37632 1      13552 1         @            @            @            @            @            @
00,3650           @            @            @            @            @            @            @            @
00,3660           @            @            @            @            @            @            @            @
00,3670           @            @            @            @            @            @            @            @

00,3700           @            @            @            @            @            @            @            @
00,3710           @            @            @            @            @            @            @            @
00,3720           @            @            @            @            @            @            @            @
00,3730           @            @            @            @            @            @            @            @

00,3740           @            @            @            @            @            @            @            @
00,3750           @            @            @            @            @            @            @            @
00,3760           @            @            @            @            @            @            @            @
00,3770           @            @            @            @            @            @            @            @
```

```
OCTAL LISTING OF PARAGRAPH # 024, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

01,2000         02061 1      30103 0      50114 0      54046 1      16014 0      02061 1      40103 1      02002 1
01,2010         02061 1      50102 1      30000 1      12002 0      02061 1      50102 1      40000 0      12002 0
01,2020         02061 1      50114 0      30046 0      16626 1      02061 1      50102 1      30000 1      50114 0
01,2030         56046 0      16626 1      02061 1      50102 1      30000 1      50114 0      26046 1      16014 0

01,2040         02061 1      30103 0      12035 1      02061 1      50102 1      40000 0      12035 1      02061 1
01,2050         50114 0      40046 1      50114 0      60046 0      00006 1      66014 1      50114 0      56046 0
01,2060         16650 0      30104 1      54114 1      10020 1      24114 0      00002 0      00002 0      10020 1
01,2070         30103 0      14105 0      10140 0      16014 0      16650 0      16014 0      16650 0      10105 1

01,2100         12102 1      16014 0      54105 1      10020 1      12070 0  C: 00360 1      16650 0      10020 1
01,2110         06710 1      16014 0      16650 0      16014 0      10020 1      12123 1  C: 12000 1      06710 1
01,2120         16014 0      16014 0      16650 0      06710 1      16650 0      16650 0      16014 0      10020 1
01,2130         16643 1  C: 00017 1      50104 1      30052 0      16626 1      32131 0      70103 1      50000 1

01,2140         37630 0      54115 0      37637 1      00006 1      70103 1      54114 1      00004 0      50000 1
01,2150         30620 0      54002 1      37634 1      00006 1      70103 1      72215 1      50000 1      12160 0
01,2160         30115 1      00006 1      04002 1      12172 0      30115 1      00006 1      06002 0      12172 0
01,2170         40115 0      70002 1      50114 0      54620 1      00003 1      37632 1      00006 1      70103 1

01,2200         72215 1      50000 1      12203 0      40002 1      70115 0      10000 0      12216 1      16702 0
01,2210         12216 1         @            @         30002 0      12204 1  C: 00014 1      24150 0      16014 0
01,2220         54626 1      10264 0      12234 1      10340 1      12234 1      10414 1      12234 1      10470 0
01,2230         12234 1      10544 0      12234 1      02233 1      67645 1      22007 0      50000 1      21777 0

01,2240         26632 1      37653 0      54635 0      32250 1      54627 0      50635 1      10153 1      12310 0
01,2250     C: 00006 1      12310 0      30632 0      50635 1      54153 1      72503 1      50635 1      54152 0
01,2260         10635 0      12275 1      54105 1      30152 1      54104 0      10067 1      12275 1         @
01,2270            @         54067 1      52634 1      52151 0      14210 1      52634 1      50635 1      52151 0

01,2300         50067 0      40153 1      60632 0      00006 1      64210 0      30635 1      54067 1      14210 1
01,2310         32416 0      26635 0      10627 0      12244 0      02314 0      52151 0      50067 0      52151 0
01,2320         52151 0      52141 1      50067 0      52141 1      52141 1      52143 0      50067 0      52143 0
01,2330         52143 0      52145 0      50067 0      52145 0      52145 0      52147 1      50067 0      52147 1

01,2340         52147 1      37653 0      56105 0      00006 1      12347 1      40152 0      54152 0      52153 1
01,2350         50067 0      52153 1      52153 1      10152 0      37653 0      12362 0      40152 0      54152 0
01,2360         37646 1      50105 0      54067 1      00003 1      52151 0      00006 1      62370 1      52006 0
01,2370         40000 0      54150 1      36232 1      70001 1      16011 0      00004 0      40153 1      54153 1
```

OCTAL LISTING OF PARAGRAPH # 025, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
01,2400        36027 1     70006 0     54151 0     47653 1     54115 0     12475 1     54626 1     37653 0
01,2410        54635 0     32250 1     54627 0     50635 1     10153 1     12420 1  C: 00014 1     12427 0
01,2420        32416 0     26635 0     10627 0     12412 0     47646 0     54635 0     14210 1     40633 0
01,2430        50635 1     60150 0     00006 1     12435 0     12420 1     50635 1     40153 1     50635 1

01,2440        54153 1     46232 0     70633 0     67634 1     56633 1     76232 0     50635 1     60151 1
01,2450        54634 1     10635 0     12275 1     12265 0     54150 1     37653 0     54114 1     32503 0
01,2460        70153 1     60632 0     54153 1     40000 0     12404 1     00004 0     47653 1     54115 0
01,2470        56153 0     72503 1     10000 0     50000 1     54000 0     10167 0     02542 0        @

01,2500        12501 0     10203 1     02542 0  C: 00777 0     12505 1     10217 1     02542 0  C: 67624 0
01,2510        12511 1     10233 1     02542 0        @        12515 0     10247 1     02542 0        @
01,2520        12521 1     10263 1     02542 0        @        12525 0     10115 0        @           @
01,2530        12532 0     14215 1     10114 1     12535 1     12363 1     50000 1     27777 0     62507 1

01,2540        54067 1     12315 0     54116 0     60115 1     10000 0     40116 0     12552 0     12550 1
01,2550        50002 0     00002 0     54115 0     00006 1     22114 0     50114 0     00002 0     54625 1
01,2560        40026 1     62562 1     10000 0     66042 1     40000 0     62657 1     60002 0     10000 0
01,2570        61400 1     12625 0     12573 0     40002 1     67631 1     67631 1     56026 0     67630 0

01,2600        60002 0     00006 1     22007 0     57400 1     57401 0     57402 0     57403 1     57404 0
01,2610        30630 1     50002 0     12613 0     53406 0     53410 1     53412 0     53414 0     53416 1
01,2620        53420 1     64267 0     00006 1     14262 1     12663 1     10000 0     61401 0     12633 1
01,2630        67646 1     02664 1  C: 00001 0     10000 0     61402 0     12641 1     67646 1     02664 1

01,2640     C: 00002 0     10000 0     61403 1     12647 1     67646 1     02664 1  C: 00003 1     10000 0
01,2650        61404 0     12655 1     67646 1     02664 1  C: 00004 0     10000 0     12663 1  C: 50001 0
01,2660        67646 1     02664 1  C: 00005 1     02663 0     54631 1     50002 0     30000 1     54002 1
01,2670        37646 1     60631 0     50002 0     27377 1     40631 1     50002 0     12603 1     00004 0

01,2700        37653 0     54721 1     54715 0     37630 0     54675 1     47632 0     00006 1     03013 0
01,2710        47643 0     00006 1     03011 1     32722 1     54003 0     37653 0     55047 1     02723 0
01,2720        14215 1     02715 0  C: 01400 1     56002 0     54114 1     37626 1     54026 1     54027 0
01,2730        37627 0     55404 1     55403 0     55402 1     55401 1     55400 0     44267 1     55405 0

01,2740        55407 1     55411 0     55413 1     55415 1     55417 0     44270 1     55406 0     55410 1
01,2750        55412 0     55414 0     55416 1     55420 1     47653 1     54153 1     54167 0     54203 1
01,2760        54217 1     54233 1     54247 1     54263 1     54067 1     33050 1     54264 0     63051 0
01,2770        54340 1     63051 0     54414 1     63051 0     54470 0     63051 0     54544 0     37646 1
```

OCTAL LISTING OF PARAGRAPH # 026, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
01,3000      55020 0      37650 0      54140 0      47633 1      50140 1      54662 1      10140 0      03002 0
01,3010      54045 1      54714 1      54651 1      54676 1      54653 0      54655 0      54652 1      54660 0
01,3020      54661 1      54677 0      54641 0      54642 0      54702 0      54703 1      54704 0      54620 1
01,3030      54621 0      54622 0      54623 1      54705 1      37647 0      54656 0      43046 1      00006 1

01,3040      03011 1      33047 1      55043 0      44506 1      54637 1      00114 0   C: 00164 1   C: 05010 0
01,3050   C: 00264 1   C: 00054 0      54016 1      56002 0      54012 0      37653 0      00006 1      01010 1
01,3060      11020 0      03063 1      03072 1      37653 0      55020 0      33071 1      54027 0      04325 1
01,3070   C: 37764 0   C: 37765 1      33070 0      54027 0      10675 1      03104 1      03104 1      56675 0

01,3100      74503 1      54675 1      64346 1      03143 1      10656 0      03107 1      04325 1      54656 0
01,3110      47653 1      54624 0      56714 0      67654 1      54714 1      50714 0      10662 1      10714 1
01,3120      03113 1      03132 1   C: 00012 1      10624 0        @          54656 0      04325 1      54624 0
01,3130      33122 0      03114 0      67646 1      50714 0      54662 1      74503 1      54624 0      34475 0

01,3140      50714 0      74333 1      60624 1      00006 1      01010 1      55023 0      37626 1      54027 0
01,3150      37646 1      55020 0      04325 1      54016 1      56002 0      54012 0      04526 1      34473 0
01,3160      00006 1      02015 1      67634 1      55024 1      34502 1      04131 0   C: 02002 1   C: 10001 1
01,3170      34473 0      71024 1      50635 1      54140 0      04325 1      54016 1      56002 0      54012 0

01,3200      04526 1      34473 0      00006 1      02016 1      03162 1      54016 1      56002 0      54012 0
01,3210      04526 1      37653 0      56045 0      54624 0      37644 0      00006 1      05011 1      34473 0
01,3220      70624 0      56624 1      56021 1      54636 0      03274 0      74473 1      63311 1      03303 1
01,3230      03274 0      74473 1      40000 0      03303 1      03270 1      43241 1      60624 1      10000 0

01,3240      03247 0   C: 00022 1      03247 0      47646 0      70715 0      54715 0      03253 0      37646 1
01,3250      70715 0      10000 0      04325 1      56624 1      67641 0      03162 1      03270 1      47646 0
01,3260      70715 0      67646 1      54715 0      37636 0      67634 1      55024 1      04325 1      04325 1
01,3270      56636 1      60000 1      54021 0      00002 0      40021 0      40021 0      40021 0      40021 0

01,3300      40021 0      40000 0      00002 0      60624 1      10000 0      03256 0        @          03256 0
01,3310      00002 0   C: 77740 1   C: 03777 0        @            @            @            @            @
01,3320        @            @            @            @            @            @            @            @
01,3330        @            @            @            @            @            @            @            @

01,3340        @            @            @            @            @            @            @            @
01,3350        @            @            @            @            @            @            @            @
01,3360        @            @            @            @            @            @            @            @
01,3370        @            @            @            @            @            @            @            @
```

```
OCTAL LISTING OF PARAGRAPH # 040, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

04,2000        03432 1      03454 1      37646 1      56652 0      54101 0      56140 1      54103 1      50000 1
04,2010        02011 0      03253 0      02062 1      02062 1      02062 1      02062 1      02062 1      02062 1
04,2020        02062 1      02053 0      02053 0      03253 0      03253 0      03253 0      03253 0      03253 0
04,2030        03253 0      02060 0      02235 1      02343 1      03253 0      03253 0      03253 0      03253 0

04,2040        03253 0      03253 0      03276 1      02267 0      02254 0      02051 1      03253 0      02407 0
04,2050        02250 1      04102 0   C: 12003 1      36165 0      70640 1      10000 0      02062 1      03253 0
04,2060        37653 0      54103 1      10637 1      02067 1      02067 1      02066 0      04205 1      02205 1
04,2070        10655 0      37653 0      54655 0      02074 0      50103 0      34333 0      74473 1      54110 0

04,2100        30637 0      54127 1      03157 1      36165 0      70640 1      10000 0      02117 1      50123 1
04,2110        56641 1      54022 0      40022 0      40022 0      56022 1      60103 0      02134 0      50123 1
04,2120        56641 1      54140 0      37653 0      54141 1      37650 0      07257 0      56141 0      60103 0
04,2130        54141 1      02134 0      26140 0      02152 0      50123 1      54641 0      40637 1      50123 1

04,2140        62176 0      00006 1      12144 0      02173 0      36165 0      70640 1      10000 0      02152 0
04,2150        40637 1      02174 1      07062 1   C: 02203 1      36165 0      70640 1      50000 1      02157 0
04,2160        02164 0      00006 1      40142 1      52142 1      56142 0      50123 1      54644 0      56141 0
04,2170        50123 1      54641 0      02150 1      10637 1      54637 1      04205 1   C: 00022 1   C: 00020 0

04,2200     C: 00012 1   C: 00005 1   C: 00000 1   C: 05174 0   C: 13261 0      50637 0      32211 1      54123 0
04,2210        00002 0   C: 00004 0   C: 00004 0   C: 00004 0   C: 00004 0   C: 00004 0   C: 00003 1   C: 00003 1
04,2220     C: 00003 1   C: 00003 1   C: 00003 1   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0
04,2230          @       C: 00001 0   C: 00001 0   C: 00000 1   C: 00000 1      37653 0      54641 0      34506 0

04,2240        54637 1      02517 0      37653 0      54640 1      54653 0      34417 1      54122 1      04205 1
04,2250        37653 0      54642 0      34507 1      02240 0      02326 1      02313 1      37645 1      50123 1
04,2260        67640 1      26640 1      10655 0      37653 0      54655 0      02266 1      04205 1      02326 1
04,2270        02273 0      37646 1      02257 0      22002 0      02205 1      50123 1      32321 0      54107 0

04,2300        67646 1      54106 1      37653 0      54110 0      56107 1      03241 0      37634 1      54110 0
04,2310        56106 0      03241 0      00001 0      22002 0      02205 1      50123 1      32321 0      54106 1
04,2320        67646 1      54107 0      02302 1   C: 00005 1   C: 00003 1   C: 00000 1      22002 0      44444 0
04,2330        02336 0      44445 1      02336 0      44446 1      02336 0      04205 1      60637 0      00006 1

04,2340        12342 1      00002 0      00001 0      56101 1      54652 1      37630 0      54675 1      47635 1
04,2350        00006 1      03013 0      42405 0      00006 1      03011 1      34511 0      54103 1      00004 0
04,2360        50103 0      10662 1      67646 1      02370 1      67646 1      40000 0      72406 0      02373 1
04,2370        40000 0      72406 0      40000 0      50103 0      54662 1      00003 1      10103 1      02356 0
```

OCTAL LISTING OF PARAGRAPH # 041, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
04,2400       37653 0      54721 1      55021 1      55044 1      04205 1   C: 00114 0   C: 73777 1      10637 1
04,2410       67646 1      02413 0      67646 1      54637 1      02205 1      10655 0      02424 1      02421 1
04,2420       02421 1      30123 1      02446 0      02441 1      10123 0      54123 0      02446 0      32515 1
04,2430       26653 0      30123 1      54111 1      00006 1      26641 0      04063 0   C: 12315 0      30111 0

04,2440       54123 0      02444 1      24655 1      04205 1      22002 0      02456 1      67656 0      10000 0
04,2450       00002 0         @         04205 1      00002 0      22002 0      02205 1      37653 0      50123 1
04,2460       54641 0      50123 1      54644 0      54110 0      50123 1      47640 0      70640 1      72516 0
04,2470       54640 1      50123 1      32506 0      54127 1      03157 1      50123 1      32511 0      54637 1

04,2500       02517 0      47645 0      26637 1      02517 0      50123 1      34442 1      54637 1      00001 0
04,2510    C: 00016 0   C: 00005 1   C: 00004 0   C: 00015 0   C: 00011 1   C: 00003 1   C: 77774 0      30637 0
04,2520       54021 0      42532 0      00004 0      50021 1      56662 0      00006 1      62530 0      24656 1
04,2530       00003 1      00002 0   C: 04000 0      37653 0      54142 1      02572 0      02540 1      02565 0

04,2540       02603 0      10140 0      56140 1      02546 1      02555 0      67655 0      62617 0      54140 0
04,2550       02553 0      37630 0      26140 0      37645 1      02534 1      56140 1      62617 0      10000 0
04,2560       02547 0         @         67646 1      40000 0      02547 0      00006 1      50142 0      32614 0
04,2570       52110 0      00002 0      10140 0      00002 0      00002 0      12576 0      47630 1      70140 0

04,2600       54140 0      50002 0      00001 0      00006 1      50142 0      32614 0      52141 1      07257 0
04,2610       52110 0      20141 1      02623 1   C: 05605 1   C: 03656 1   C: 16314 0   C: 31463 1   C: 16040 1
04,2620       52110 0      52141 1      07257 0      04102 0   C: 12513 0      02637 1      56142 0      56141 0
04,2630       54140 0      02623 1      02637 1      02623 1      02637 1      03032 0      02623 1      56002 0

04,2640       54105 1      50124 0      02642 0      02660 0      50103 0      30134 1      74503 1      04440 0
04,2650       00006 1      50000 1      30001 0      52141 1      07062 1   C: 00107 1      07226 0      00105 0
04,2660       30131 1      02650 0      50124 0      02663 0      02666 0      03255 0      00006 1      50131 1
04,2670       30001 0      54141 1      34444 1      54637 1      37653 0      54142 1      07226 0      03133 0

04,2700       00122 0      07062 1   C: 02744 1      10141 1      37634 1      02707 0      47634 0      60141 0
04,2710       03044 1      04532 1      04532 1      03053 1      04532 1      10140 0      02722 1      02722 1
04,2720       40000 0      54140 0      10105 1      02740 0      02734 0      10140 0         @         02736 1
04,2730       02731 0      50140 1      77626 0      54140 0      04102 0   C: 13040 1      47626 0      02733 1

04,2740       40140 0      77626 0      40000 0      02733 1   C: 26161 0   C: 30707 1   C: 21616 0   C: 07071 0
04,2750    C: 71527 1      07062 1   C: 00107 1      56142 0      56141 0      56140 1      00006 1      12761 1
04,2760       03255 0      03042 1      03053 1      02734 0      10140 0      02771 1      02771 1      03255 0
04,2770       03255 0      32750 1      26140 0      07062 1   C: 02746 0      37633 0      60141 0      03044 1
```

OCTAL LISTING OF PARAGRAPH # 042, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
04,3000        02712 1      07062 1   C: 00107 1      56142 0      60000 1      54142 1      37653 0      60141 0
04,3010        03044 1      03053 1      50124 0      03013 0      03024 1      30103 0      60131 1      54002 1
04,3020        56141 0      50002 0      54001 1      02734 0      37653 0      03016 0      07062 1   C: 00107 1
04,3030        03032 0      03003 1      56002 0      54110 0      36162 1      54107 0      04532 1      10107 0

04,3040        03035 1      00110 1      56141 0      60000 1      54141 1      00002 0      60140 1      54140 0
04,3050        00002 0      54105 1      00002 0      10105 1      03255 0      00002 0      03255 0      56002 0
04,3060        54101 0      10140 0      03071 1      03071 1      67646 1      54140 0      02313 1      40141 1
04,3070        03073 0      02273 0      56141 0      63132 1      54141 1      37653 0      60140 1      54140 0

04,3100        03104 1      37626 1      54140 0      54141 1      37644 0      54123 0      34511 0      07257 0
04,3110        50140 1      34333 0      74473 1      54110 0      37653 0      56142 0      56141 0      54140 0
04,3120        56637 0      54127 1      10000 0      54637 1      03157 1      10123 0      03105 0      44506 1
04,3130        54637 1      00101 1   C: 02476 0      56002 0      54101 0      37653 0      54110 0      36165 0

04,3140        03241 0      37644 0      03241 0      10140 0      03154 1      03154 1      67646 1      54140 0
04,3150        02313 1      40141 1      54141 1      03155 0      02273 0      34445 0      03105 0      56002 0
04,3160        54100 1      34473 0      70127 1      54021 0      56021 1      54125 0      37646 1      70127 1
04,3170        10000 0      03173 1      03203 0      56110 1      04465 1      54110 0      37631 1      70127 1

04,3200        10000 0      37645 1      67646 1      54127 1      00004 0      50125 1      10662 1      03211 0
04,3210           @         67646 1      54126 0      50127 0      73235 1      00006 1      60110 1      00006 1
04,3220        13233 1      50127 0      43235 1      70126 0      60110 1      40000 0      50125 1      56662 0
04,3230        00006 1      63233 0      24656 1      00003 1      00100 0   C: 00037 0   C: 01740 0   C: 02000 0

04,3240     C: 03740 1      54125 0      37645 1      54127 1      56002 0      54100 1      03204 1      03157 1
04,3250        33252 1      04105 1   C: 13250 1      34417 1      54122 1      04512 0      43265 1      60122 0
04,3260        00006 1      13263 1      00122 0      04662 1   C: 01501 1      04376 1      37646 1      54654 1
04,3270        04610 1      04547 0      03400 0      04400 1      47646 0      03267 1      47644 1      00006 1

04,3300        03011 1      04610 1      04205 1      37225 0      54637 1      54127 1      37646 1      70127 1
04,3310        56127 0      54021 0      56021 1      50000 1      10662 1      03317 1         @         67646 1
04,3320        50127 0      73235 1      50127 0      03324 1      03326 0      04447 1      54110 0      47225 1
04,3330        60637 0      10000 0      67646 1      03335 1         @         54127 1      03157 1      40637 1

04,3340        64444 1      10000 0      56637 0      67646 1      03304 0      37653 0      54637 1      63376 0
04,3350        50000 1      10662 1      03354 0         @         67646 1      77634 0      54110 0      50637 0
04,3360        33374 1      03241 0      40637 1      63376 0      10000 0      56637 0      67646 1      03346 0
04,3370        34444 1      54637 1      02454 0      00122 0   C: 00000 1   C: 00001 0   C: 00003 1   C: 00004 0
```

OCTAL LISTING OF PARAGRAPH # 043, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
04,3400      10676 1    03406 0    04205 1    03406 0    54676 1    03424 0    37653 0    56676 0
04,3410      00004 0    04170 0    10654 1    03430 0    04205 1    03426 1    37645 1    50635 1
04,3420      60150 0    50635 1    54150 1    00003 1    04633 0    04205 1    37653 0    03417 0
04,3430      37646 1    03417 0    54001 1    10677 0    03437 1    30001 0    04105 1    37645 1

04,3440      54130 1    50130 0    10702 0    03445 1    03450 0    10130 1    03440 1    03514 1
04,3450      30001 0    50130 0    54702 0    04164 0    54001 1    10652 1    03461 1    30001 0
04,3460      04105 1    37645 1    54677 0    30001 0    56704 1    56703 0    56702 1    10000 0
04,3470      03514 1    03473 1    03514 1    04522 0    30001 0    04164 0    34502 1    04131 0

04,3500   C: 03503 1 C: 10001 1    04321 0    04636 0    03512 1    04170 0    00003 1    37646 1
04,3510      54677 0    04205 1    37653 0    03510 0    04662 1 C: 01206 1       @          @
04,3520         @          @          @          @          @          @          @          @
04,3530         @          @          @          @          @          @          @          @

04,3540         @          @          @          @          @          @          @          @
04,3550         @          @          @          @          @          @          @          @
04,3560         @          @          @          @          @          @          @          @
04,3570         @          @          @          @          @          @          @          @

04,3600         @          @          @          @          @          @          @          @
04,3610         @          @          @          @          @          @          @          @
04,3620         @          @          @          @          @          @          @          @
04,3630         @          @          @          @          @          @          @          @

04,3640         @          @          @          @          @          @          @          @
04,3650         @          @          @          @          @          @          @          @
04,3660         @          @          @          @          @          @          @          @
04,3670         @          @          @          @          @          @          @          @

04,3700         @          @          @          @          @          @          @          @
04,3710         @          @          @          @          @          @          @          @
04,3720         @          @          @          @          @          @          @          @
04,3730         @          @          @          @          @          @          @          @

04,3740         @          @          @          @          @          @          @          @
04,3750         @          @          @          @          @          @          @          @
04,3760         @          @          @          @          @          @          @          @
04,3770         @          @          @          @          @          @          @          @
```

OCTAL LISTING OF PARAGRAPH # 044, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
05,2000        03344 1      13403 1      02663 0      37653 0      54655 0      34417 1      54122 1      10653 0
05,2010        02031 1      02031 1      02013 1      36165 0      70640 1      10000 0      02020 1      02024 0
05,2020        10637 1      02324 0      02324 0      02024 0      40653 0      54653 0      04547 0      00653 1
05,2030     C: 00030 1      37653 0      54640 1      40641 0      62030 0      00006 1      62116 0      00006 1

05,2040        32076 1      52006 0      50124 0      02043 1      02046 1      02176 0      10132 0      02114 1
05,2050        02324 0      02055 0      24657 0      04436 1      02102 0      37630 0      54655 0      44417 0
05,2060        60122 0      00006 1      12064 0      02100 1      02256 1      10640 1      02324 0      56645 0
05,2070        04430 1      00006 1      32076 1      52006 0      02116 0   C: 02000 0   C: 14001 0   C: 77772 0

05,2100        30142 0      04430 1      47643 0      70641 0      62077 0      00006 1      12116 1      34446 0
05,2110        54637 1      30657 0      03222 0      02116 0      67646 1      04430 1      42131 1      60641 1
05,2120        10000 0      67646 1      02124 1      02133 1      54140 0      04610 1      56140 1      62132 0
05,2130        04105 1   C: 00040 0   C: 11255 0      50641 1      32136 1      04105 1   C: 12324 1   C: 12340 0

05,2140     C: 12345 0   C: 12352 0   C: 12333 1   C: 12326 0   C: 12445 1   C: 10662 1   C: 11255 0   C: 13077 0
05,2150     C: 13077 0   C: 13077 0   C: 13077 0   C: 13077 0   C: 13077 0   C: 13077 0   C: 12324 1   C: 12620 0
05,2160     C: 12631 0   C: 12646 0   C: 12572 1   C: 12535 1   C: 12324 1   C: 13214 1   C: 13314 0   C: 13340 1
05,2170     C: 11303 1   C: 11266 0   C: 11273 1   C: 13414 1   C: 02677 0   C: 13267 0      10132 0      02203 1

05,2200        02324 0      02203 1      02203 1      46162 0      60641 1      00006 1      62210 0      02116 0
05,2210        37645 1      52103 1      62235 1      54131 0      50103 0      30134 1      54106 1      02721 1
05,2220        02236 1      02223 0      24106 0      30106 0      74503 1      04440 0      50000 1      30000 1
05,2230        50131 1      56000 1      10103 1      02211 1      02116 0      00111 0      50000 1      12240 1

05,2240        00002 0      00002 0      00002 0      00002 0      12250 0      12250 0      00002 0      12250 0
05,2250        50002 0      00001 0      34444 1      12257 1      34445 0      12257 1      34446 0      54637 1
05,2260        40002 1      54653 0      04063 0   C: 10454 0      04543 1      44417 0      60122 0      00006 1
05,2270        12273 1      47653 1      54676 1      00122 0      54642 0      56002 0      54103 1      00006 1

05,2300        32076 1      52006 0      10132 0      67646 1      12307 0      12310 0      12310 0      04430 1
05,2310        34507 1      54637 1      30642 1      12322 1      54641 0      56002 0      54103 1      34506 0
05,2320        54637 1      30641 1      03255 0      00103 0      04102 0   C: 11255 0      47645 0      02376 1
05,2330        50131 1      40002 1      56116 1      47646 0      02376 1      50131 1      40001 1      56115 1

05,2340        02420 0      50131 1      40000 0      56114 0      02357 1      47646 0      02376 1      50131 1
05,2350        40001 1      02343 1      47645 0      02376 1      50131 1      40002 1      02343 1      47645 0
05,2360        60641 1      10000 0      02365 0      00122 0      02365 0      54106 1      50000 1      34444 1
05,2370        54637 1      50106 0      40114 1      03222 0      56106 0      02361 1      54107 0      22002 0
```

OCTAL LISTING OF PARAGRAPH # 045, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
05,2400      47646 0     60642 1     00006 1     12417 0     50124 0     32442 1     50000 1     30000 1
05,2410      74475 1     04456 1     60107 1     10000 0     00001 0        @        02324 0     00001 0
05,2420      22002 0     30132 1     67646 1     00006 1     12436 0     50124 0     02426 0     02431 0
05,2430      00001 0     02713 0     02236 1     00001 0     24131 1     00001 0     00006 1     50657 0

05,2440      00000 1     40000 0     12343 0  C: 00133 0  C: 00132 1     50124 0     32442 1     50000 1
05,2450      30000 1     74475 1     04456 1     54103 1     54106 1     60131 1     50000 1     40000 0
05,2460      50106 0     56643 0     10106 1     02454 0     37653 0     54141 1     54142 1     50103 0
05,2470      34444 1     54637 1     50103 0     40643 1     54140 0     02734 0     54107 0     00006 1

05,2500      32512 0     52006 0     50124 0     02503 0     02507 1     02721 1     02522 0     02713 0
05,2510      02522 0  C: 02037 1  C: 14001 0     04063 0  C: 11057 0     10103 1     02520 1     00122 0
05,2520      54103 1     02464 0     50000 1     32525 1     04105 1  C: 11255 0  C: 12513 0  C: 10533 0
05,2530   C: 10620 1  C: 10625 1  C: 10632 1  C: 10541 0  C: 10634 1     47645 0     02376 1     32673 1

05,2540      02314 0     02252 0     32674 0     02314 0     02254 0     32675 1     02314 0     02256 1
05,2550      46162 0     02676 1     00006 1     32076 1     52006 0     37653 0     02762 0     50131 1
05,2560      54000 0     37646 1     02762 0     50131 1     54001 1     37645 1     02762 0     50131 1
05,2570      54002 1     02663 0     47646 0     02376 1     32673 1     02314 0     02252 0     32674 0

05,2600      02314 0     02254 0     47225 1     02676 1     00006 1     32076 1     52006 0     37653 0
05,2610      02762 0     50131 1     54000 0     37646 1     02762 0     50131 1     54001 1     02663 0
05,2620      02252 0     00006 1     32076 1     52006 0     37653 0     02762 0     50131 1     54000 0
05,2630      02663 0     47646 0     02376 1     37630 0     54655 0     02254 0     00006 1     32076 1

05,2640      52006 0     37646 1     02762 0     50131 1     54001 1     02663 0     47645 0     02376 1
05,2650      37630 0     54655 0     02256 1     00006 1     32076 1     52006 0     37645 1     02762 0
05,2660      50131 1     54002 1     02663 0     37653 0     54640 1     47653 1     54654 1     44506 1
05,2670      54637 1     04102 0  C: 11400 0  C: 00021 1  C: 00022 1  C: 00023 0     54103 1     40640 1

05,2700      54021 0     40021 0     40021 0     10000 0     12706 0     00002 0     60103 0     00006 1
05,2710      12712 0     02324 0     00002 0     56002 0     54100 1     34474 1     70133 1     04447 1
05,2720      00100 0     56002 0     54100 1     50103 0     32753 1     54001 1     50103 0     34473 0
05,2730      70137 0     50001 0     00000 1     00100 0     56002 0     54100 1     50124 0     02737 0

05,2740      02756 1     50103 0     32753 1     54001 1     50103 0     34473 0     70133 1     50001 0
05,2750      00000 1     60000 1     00100 0     02712 1     04447 1     04456 1     34473 0     70133 1
05,2760      60000 1     00100 0     54103 1     56002 0     54101 0     37653 0     54105 1     50103 0
05,2770      56646 0     54141 1     50103 0     56643 0     54140 0     50124 0     02776 0     03023 0
```

OCTAL LISTING OF PARAGRAPH # 046, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
05,3000        50103 0     30134 1     74503 1     04430 1     00006 1     60103 0     54131 0     10640 1
05,3010        03051 0     02721 1     02236 1     03040 0     24131 1     30131 1     26103 1     37653 0
05,3020        50103 0     53777 0     03040 0     04436 1     10640 1     03051 0     02713 0     02236 1
05,3030        03034 0     37653 0     54103 1     03014 1     30132 1     67646 1     00006 1     13044 0

05,3040        56140 1     00101 1  C: 02045 1  C: 14001 0     56140 1     00006 1     50657 0     01000 0
05,3050        02663 0     02734 0     54107 0     00006 1     33043 0     52006 0     50124 0     03057 0
05,3060        03063 1     02721 1     03064 0     02713 0     50000 1     33067 0     04105 1  C: 11255 0
05,3070     C: 10761 0  C: 10701 0  C: 10751 0  C: 11001 0  C: 11026 0  C: 10764 0  C: 11001 0     47630 1

05,3100        70657 1     54141 1     33401 1     70641 0     04456 1     54022 0     56022 1     60642 1
05,3110        54140 0     40677 0     67645 1     10000 0     04633 0     03121 0        @        37653 0
05,3120        54652 1     00004 0     10660 0     03130 0     37646 1     04251 0  C: 03134 1  C: 12001 0
05,3130        52141 1     52661 1     00003 1     00122 0     04526 1     10661 1     03142 0     03142 0

05,3140        03153 0     03153 0     33157 1     04251 0  C: 03134 1  C: 12001 0     34502 1     04131 0
05,3150     C: 03160 0  C: 12001 0     04321 0     37653 0     54660 0     54661 1     04321 0  C: 00144 0
05,3160        10661 1     03165 0     03165 0     04205 1     04205 1     10652 1     03212 0     33401 1
05,3170        70660 0     54107 0     04372 0     04205 1     33210 1     70660 0     04447 1     54020 1

05,3200        56020 0     54641 0     33211 0     54122 1     47630 1     70661 1     54142 1     02037 1
05,3210     C: 00700 0  C: 04347 0     04522 0     04205 1     34444 1     54637 1     30657 0     04116 0
05,3220        03222 0     04205 1     54022 0     56002 0     54101 0     37631 1     26637 1     37644 0
05,3230        54123 0     40022 0     40022 0     40022 0     40000 0     77652 0     50000 1     34333 0

05,3240        74473 1     54110 0     56637 0     54127 1     10000 0     54637 1     04102 0  C: 11247 0
05,3250        10123 0     03230 0     44506 1     54637 1     00101 1     54020 1     56002 0     54101 0
05,3260        37646 1     54123 0     40020 1     40020 1     56020 0     54022 0     03235 0     03302 0
05,3270        37653 0     56642 1     54140 0     34507 1     54637 1     04063 0  C: 10517 0     30140 1

05,3300        04102 0  C: 11255 0     40002 1     54653 0     34507 1     54637 1     37653 0     54642 0
05,3310        04063 0  C: 10517 0     04543 1     00122 0     37646 1     70706 1     10000 0     03336 1
05,3320        34476 0     54140 0     47646 0     70706 1     54144 1     04610 1     34417 1     54143 0
05,3330        00006 1     30710 1     52142 1     30144 0     00004 0     00140 1     34501 1     03321 1

05,3340        34477 1     54140 0     30706 0     03324 1     33363 1     54122 1     33401 1     70107 0
05,3350        54140 0     33402 1     70107 0     04447 1     54020 1     56020 0     54141 1     10140 0
05,3360        03364 0     56141 0     02314 0     04376 1     10141 1     03371 1     56140 1     02274 1
05,3370        04376 1     56141 0     02314 0     56140 1     02274 1     37653 0     54654 1     54655 0
```

```
OCTAL LISTING OF PARAGRAPH # 047, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

05,3400       02031 1    C: 00077 1    C: 07700 1       34510 1       56637 0       54124 1       30651 0       22002 0
05,3410       03255 0       50124 0       54637 1       00001 0       33453 0       00006 1       05011 1       33454 1
05,3420       54675 1       37635 0       00006 1       05013 0       00004 0       37650 0       54103 1       43451 0
05,3430       50103 0       54662 1       10103 1       03426 1       43452 0       54663 0       54666 0       54670 1

05,3440       37647 0       54656 0       00003 1       33456 0       00004 0       04251 0    C: 03457 1    C: 12001 0
05,3450       04205 1    C: 05675 0    C: 07675 1    C: 00174 0    C: 40777 1    C: 00114 0    C: 00764 1       34502 1
05,3460       04131 0    C: 03464 1    C: 12001 0       04321 0       43455 1       00006 1       03011 1       47635 1
05,3470       00006 1       04013 0       37630 0       54675 1       02001 1       04102 0    C: 11273 1          @

05,3500          @             @             @             @             @             @             @             @
05,3510          @             @             @             @             @             @             @             @
05,3520          @             @             @             @             @             @             @             @
05,3530          @             @             @             @             @             @             @             @

05,3540          @             @             @             @             @             @             @             @
05,3550          @             @             @             @             @             @             @             @
05,3560          @             @             @             @             @             @             @             @
05,3570          @             @             @             @             @             @             @             @

05,3600          @             @             @             @             @             @             @             @
05,3610          @             @             @             @             @             @             @             @
05,3620          @             @             @             @             @             @             @             @
05,3630          @             @             @             @             @             @             @             @

05,3640          @             @             @             @             @             @             @             @
05,3650          @             @             @             @             @             @             @             @
05,3660          @             @             @             @             @             @             @             @
05,3670          @             @             @             @             @             @             @             @

05,3700          @             @             @             @             @             @             @             @
05,3710          @             @             @             @             @             @             @             @
05,3720          @             @             @             @             @             @             @             @
05,3730          @             @             @             @             @             @             @             @

05,3740          @             @             @             @             @             @             @             @
05,3750          @             @             @             @             @             @             @             @
05,3760          @             @             @             @             @             @             @             @
05,3770          @             @             @             @             @             @             @             @
```

```
OCTAL LISTING OF PARAGRAPH # 050, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

06,2000        52136 1      50642 1      32052 1      54132 0      50642 1      32152 0      54133 1      40642 0
06,2010        62036 0      00006 1      62016 1      37646 1      54124 1      02034 1      37645 1      54124 1
06,2020        50642 1      32345 1      54137 0      36425 1      70132 0      54002 1      50000 1      32332 1
06,2030        54134 0      00006 1      50002 0      32334 1      52136 1      52006 0   C: 00055 1      52110 0

06,2040        00006 1      50000 1      32303 0      52110 0      52006 0      52110 0      00006 1      50000 1
06,2050        32253 1      12043 0   C: 00000 1   C: 40000 0   C: 40000 0   C: 40000 0   C: 40000 0   C: 40000 0
06,2060     C: 40000 0   C: 40000 0   C: 77776 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 77777 0
06,2070     C: 00024 1   C: 00024 1   C: 00032 0   C: 00037 0   C: 00716 1   C: 00711 0   C: 00706 0   C: 00706 0

06,2100     C: 00706 0   C: 01047 0   C: 00706 0   C: 00721 0   C: 00722 0   C: 00724 0   C: 00726 1   C: 00730 0
06,2110     C: 00733 0   C: 00736 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
06,2120     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00741 0   C: 00744 0   C: 00747 0   C: 02000 0
06,2130     C: 04002 1   C: 02005 0   C: 04007 1   C: 02012 0   C: 02014 0   C: 02016 1   C: 02020 1   C: 02022 0

06,2140     C: 04024 0   C: 04027 0   C: 04032 1   C: 04035 0   C: 04040 1   C: 04043 1   C: 04046 1   C: 04051 1
06,2150     C: 04054 1   C: 04057 1   C: 00000 1   C: 00040 0   C: 00140 1   C: 00102 1   C: 00241 0   C: 00200 0
06,2160     C: 00203 0   C: 00302 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
06,2170     C: 00200 0   C: 00241 0   C: 04102 0   C: 04140 0   C: 04102 0   C: 04102 0   C: 00200 0   C: 00140 1

06,2200     C: 04000 0   C: 00140 1   C: 04140 0   C: 02000 0   C: 00252 1   C: 00252 1   C: 00350 1   C: 04102 0
06,2210     C: 04000 0   C: 04000 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
06,2220     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 04144 1   C: 04145 0   C: 04145 0   C: 00102 1
06,2230     C: 00102 1   C: 00102 1   C: 00000 1   C: 00542 1   C: 00002 0   C: 00002 0   C: 00002 0   C: 00001 0

06,2240     C: 00000 1   C: 06143 1   C: 14306 1   C: 16347 0   C: 20410 0   C: 22451 1   C: 00412 0   C: 20450 1
06,2250     C: 20410 0   C: 22451 1   C: 00006 1   C: 03240 1   C: 00253 0   C: 25124 1   C: 00000 1   C: 00000 1
06,2260     C: 00021 1   C: 30707 1   C: 00001 0   C: 02133 1   C: 00011 1   C: 30322 1   C: 00004 0   C: 14021 1
06,2270     C: 00314 1   C: 31463 1   C: 23420 0   C: 00000 1   C: 00201 1   C: 30327 1   C: 01371 0   C: 34750 1

06,2300     C: 00001 0   C: 03434 1   C: 05174 0   C: 13261 0   C: 27670 0   C: 31357 1   C: 00000 1   C: 00000 1
06,2310     C: 01631 1   C: 23146 0   C: 35753 0   C: 32323 1   C: 03216 1   C: 06400 0   C: 07237 0   C: 37776 0
06,2320     C: 00120 1   C: 00000 1   C: 00321 1   C: 26706 1   C: 37441 1   C: 14247 0   C: 05300 1   C: 20305 0
06,2330     C: 34631 1   C: 23146 0   C: 00036 1   C: 00035 1   C: 00706 0   C: 00707 1   C: 00710 1   C: 00752 1

06,2340     C: 00753 0   C: 01017 0   C: 01017 0   C: 01021 0   C: 00706 0   C: 00707 1   C: 00034 0   C: 00024 1
06,2350     C: 00036 1   C: 00024 1   C: 00035 1   C: 00024 1   C: 00754 1   C: 00754 1   C: 00711 0   C: 00712 0
06,2360     C: 00713 1   C: 00756 0   C: 00760 0   C: 00762 1   C: 00764 1   C: 00766 0   C: 00770 1   C: 00765 0
06,2370     C: 00767 1   C: 00771 0   C: 01000 0   C: 01002 1   C: 01004 1   C: 01006 0   C: 01010 1   C: 01012 0
```

```
OCTAL LISTING OF PARAGRAPH # 051, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

06,2400    C: 00722 0   C: 00726 1   C: 01014 0   C: 00706 0   C: 00710 1   C: 01015 1   C: 00706 0   C: 00710 1
06,2410    C: 00712 0   C: 00706 0   C: 00710 1   C: 00712 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
06,2420    C: 00000 1   C: 00000 1   C: 00302 0   C: 10302 1   C: 00302 0   C: 00000 1   C: 00142 0   C: 00202 1
06,2430    C: 00202 1   C: 00206 0   C: 00205 0   C: 06043 0   C: 10204 0   C: 06143 1   C: 06143 1   C: 16347 0

06,2440    C: 12245 1   C: 00345 0   C: 16247 1   C: 16347 0   C: 12245 1        @            @            @
06,2450         @            @            @            @            @            @            @            @
06,2460         @            @            @            @            @            @            @            @
06,2470         @            @            @            @            @            @            @            @

06,2500         @            @            @            @            @            @            @            @
06,2510         @            @            @            @            @            @            @            @
06,2520         @            @            @            @            @            @            @            @
06,2530         @            @            @            @            @            @            @            @

06,2540         @            @            @            @            @            @            @            @
06,2550         @            @            @            @            @            @            @            @
06,2560         @            @            @            @            @            @            @            @
06,2570         @            @            @            @            @            @            @            @

06,2600         @            @            @            @            @            @            @            @
06,2610         @            @            @            @            @            @            @            @
06,2620         @            @            @            @            @            @            @            @
06,2630         @            @            @            @            @            @            @            @

06,2640         @            @            @            @            @            @            @            @
06,2650         @            @            @            @            @            @            @            @
06,2660         @            @            @            @            @            @            @            @
06,2670         @            @            @            @            @            @            @            @

06,2700         @            @            @            @            @            @            @            @
06,2710         @            @            @            @            @            @            @            @
06,2720         @            @            @            @            @            @            @            @
06,2730         @            @            @            @            @            @            @            @

06,2740         @            @            @            @            @            @            @            @
06,2750         @            @            @            @            @            @            @            @
06,2760         @            @            @            @            @            @            @            @
06,2770         @            @            @            @            @            @            @            @
```

OCTAL LISTING OF PARAGRAPH # 054, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
07,2000      34711 1     55045 0     55046 0     02005 0     02011 0     12007 0     04770 0     00002 0
07,2010      04770 0     34743 0     55034 0     11034 0     04770 0     04770 0     02020 1     04770 0
07,2020      10000 0     02025 1     04770 0     04770 0     04770 0     10000 0     02032 1     04770 0
07,2030      04770 0     04770 0     10000 0     04770 0     02037 1     04770 0     04770 0     40000 0

07,2040      10000 0     04770 0     04770 0     04770 0     10000 0     04770 0     02051 1     04770 0
07,2050      04770 0     44746 1     74746 1     04753 1     44711 0     74711 0     04753 1     34711 1
07,2060      74711 0     04753 1     34746 0     74746 1     04754 0     34746 0     54023 1     70023 1
07,2070      55034 0     70023 1     40000 0     61034 1     04754 0     34712 1     54001 1     34746 0

07,2100      70001 1     04761 0     34725 0     55034 0     61034 1     55035 1     04770 0     04761 0
07,2110      57034 1     40000 0     60000 1     55036 1     04770 0     61036 0     61035 0     61034 1
07,2120      55037 0     41037 0     04761 0     34725 0     55034 0     25034 1     25034 1     25034 1
07,2130      64726 0     04754 0     41034 0     55034 0     25034 1     31034 1     04762 0     34744 1

07,2140      54001 1     24001 0     30001 0     04762 0     34706 1     55034 0     27034 0     27034 0
07,2150      55035 1     04770 0     41034 0     04754 0     34723 0     54001 1     64712 1     26001 1
07,2160      64726 0     04754 0     40001 1     64725 0     04754 0     34712 1     55034 0     23034 1
07,2170      40000 0     55035 1     23035 0     41035 1     04762 0     30001 0     04762 0     34725 0

07,2200      60000 1     54001 1     04770 0     44725 1     60000 1     22000 1     55034 0     02211 1
07,2210      04770 0     30001 0     55035 1     02215 0     04770 0     61034 1     04754 0     34725 0
07,2220      55035 1     40000 0     54001 1     64712 1     55034 0     40000 0     53035 1     60001 0
07,2230      04761 0     31034 1     61035 0     04762 0     34723 0     55034 0     55035 1     54001 1

07,2240      64712 1     21035 1     04753 1     56001 0     04753 1     41034 0     61035 0     04762 0
07,2250      34725 0     55034 0     55035 1     54001 1     34712 1     21035 1     04761 0     56001 0
07,2260      04753 1     41034 0     04762 0     34726 0     61035 0     04762 0     34725 0     55034 0
07,2270      40000 0     55035 1     40000 0     64745 0     54001 1     40000 0     21035 1     04753 1

07,2300      56001 0     04753 1     31034 1     04761 0     31035 0     04762 0     44723 1     55034 0
07,2310      55035 1     54001 1     64745 0     21035 1     04753 1     56001 0     04753 1     41035 1
07,2320      61034 1     04762 0     34726 0     55034 0     55035 1     54001 1     34745 0     21035 1
07,2330      04762 0     56001 0     04753 1     31034 1     04762 0     34725 0     61035 0     04761 0

07,2340      34726 0     55035 1     54001 1     40000 0     55034 0     20001 1     55036 1     04770 0
07,2350      30001 0     61036 0     04762 0     34711 1     55025 0     34670 1     55026 0     34663 0
07,2360      55027 1     34664 1     55030 1     34665 0     55031 0     34666 0     55032 0     34667 1
07,2370      55033 1     51026 1     30000 1     51027 0     54000 0     51025 1     40000 0     51027 0
```

```
OCTAL LISTING OF PARAGRAPH # 055, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "1" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

07,2400         56000 1     51025 1     10000 0     02407 0     04770 0     04770 0     04770 0     51027 0
07,2410         60000 1     51032 1     00003 1     04770 0     51032 1     00006 1     02423 0     51033 0
07,2420         10003 0     04770 0     00002 0     04762 0     34725 0     64712 1     51027 0     54000 0
07,2430         04770 0     61034 1     51026 1     70000 0     04761 0     34723 0     55034 0     51025 1

07,2440         51027 0     26000 0     51027 0     24000 1     40000 0     61034 1     04761 0     34726 0
07,2450         55035 1     34712 1     55036 1     51031 1     22000 1     34744 1     51027 0     20001 1
07,2460         51027 0     52001 1     60001 0     04762 0     41034 0     04754 0     31035 0     04753 1
07,2470         34671 0     64707 0     55042 1     51042 0     20003 0     04770 0     34663 0     50000 1

07,2500         54000 0     40000 0     61034 1     04754 0     00006 1     34673 1     55035 1     56001 0
07,2510         55034 0     00006 1     61035 0     04761 0     00006 1     41035 1     00006 1     60001 0
07,2520         04762 0     34725 0     54001 1     60000 1     00006 1     40001 1     55034 0     04770 0
07,2530         31034 1     00006 1     60001 0     04761 0     34744 1     54002 1     34712 1     54001 1

07,2540         34701 0     00006 1     30002 0     60001 0     04762 0     32555 0     55034 0     02551 1
07,2550         04770 0     00006 1     23034 1     00002 0     04770 0  C: 02557 1  C: 02550 0     41034 0
07,2560         62556 0     04754 0     34711 1     02565 0     12571 1     00006 1     22000 1     22002 0
07,2570         00000 1     30001 0     04753 1     34711 1     55034 0     40000 0     55035 1     00006 1

07,2600         25034 1     00006 1     25034 1     04754 0     00006 1     25035 0     00006 1     25035 0
07,2610         00006 1     25035 0     04753 1     31035 0     61034 1     04762 0     34746 0     00006 1
07,2620         24000 1     04762 0     34711 1     55034 0     00006 1     27034 0     31034 1     04753 1
07,2630         40000 0     55034 0     00006 1     27034 0     31034 1     04754 0     34713 0     55034 0

07,2640         00006 1     27034 0     64745 0     04761 0     31034 1     04761 0     00006 1     27034 0
07,2650         04753 1     31034 1     04754 0     44713 1     55035 1     00006 1     27035 1     31035 0
07,2660         04762 0     00006 1     27035 1     04753 1     31035 0     04754 0     34744 1     00006 1
07,2670         26000 0     04762 0     34725 0     55034 0     00006 1     21034 0     04753 1     55035 1

07,2700         00006 1     21035 1     04753 1     34746 0     55036 1     00006 1     21036 1     04753 1
07,2710         00006 1     21036 1     04761 0     40000 0     00006 1     21035 1     04762 0     34720 0
07,2720         55037 0     34717 1     55040 0     00006 1     21037 0     04762 0     34720 0     00006 1
07,2730         21040 0     04761 0     34740 0     55041 1     34737 0     55042 1     00006 1     21041 1

07,2740         04762 0     34740 0     00006 1     21042 1     04761 0     34746 0     54001 1     00006 1
07,2750         20001 1     04753 1     02754 0     02774 1     34716 0     00006 1     14770 1     40000 0
07,2760         00006 1     14770 1     34711 1     00006 1     12766 0     04770 0     40000 0     00006 1
07,2770         12772 0     04770 0     00002 0     04770 0     02776 0     03017 1     34702 0     00006 1
```

OCTAL LISTING OF PARAGRAPH # 056, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
07,3000       64770 0     40000 0     00006 1     63005 1     04770 0     34711 1     00006 1     63011 1
07,3010       04770 0     40000 0     00006 1     63015 0     04770 0     00002 0     04770 0     34725 0
07,3020       00006 1     74713 1     60001 0     55034 0     00006 1     74744 0     60001 0     55035 1
07,3030       00006 1     74713 1     60001 0     55036 1     00006 1     74744 0     60001 0     61036 0

07,3040       61035 0     61034 1     04754 0     34725 0     00006 1     70000 0     60001 0     55034 0
07,3050       00006 1     74726 1     60001 0     55035 1     00006 1     74725 1     60001 0     55036 1
07,3060       00006 1     74726 1     60001 0     61036 0     61035 0     61034 1     04754 0     34725 0
07,3070       00006 1     74711 0     60001 0     04753 1     34712 1     00006 1     74746 1     60001 0

07,3100       04753 1     34745 0     00006 1     74711 0     60001 0     04753 1     34746 0     00006 1
07,3110       74746 1     60001 0     04753 1     34711 1     00006 1     74725 1     60001 0     04753 1
07,3120       00006 1     74745 1     60001 0     04754 0     40000 0     00006 1     74716 1     60001 0
07,3130       04754 0     40000 0     00006 1     74746 1     60001 0     04753 1     34711 1     55034 0

07,3140       00006 1     71034 0     60001 0     04753 1     00006 1     74746 1     60001 0     04753 1
07,3150       34746 0     00006 1     74711 0     60001 0     04753 1     34746 0     00006 1     74746 1
07,3160       04753 1     33163 0     04105 1  C: 20000 0        @           @           @           @
07,3170          @           @           @           @           @           @           @           @

07,3200          @           @           @           @           @           @           @           @
07,3210          @           @           @           @           @           @           @           @
07,3220          @           @           @           @           @           @           @           @
07,3230          @           @           @           @           @           @           @           @

07,3240          @           @           @           @           @           @           @           @
07,3250          @           @           @           @           @           @           @           @
07,3260          @           @           @           @           @           @           @           @
07,3270          @           @           @           @           @           @           @           @

07,3300          @           @           @           @           @           @           @           @
07,3310          @           @           @           @           @           @           @           @
07,3320          @           @           @           @           @           @           @           @
07,3330          @           @           @           @           @           @           @           @

07,3340          @           @           @           @           @           @           @           @
07,3350          @           @           @           @           @           @           @           @
07,3360          @           @           @           @           @           @           @           @
07,3370          @           @           @           @           @           @           @           @
```

OCTAL LISTING OF PARAGRAPH # 060, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
10,2000     04224 1     34747 1     55042 1     54002 1     40000 0     55041 1     34711 1     54001 1
10,2010     34706 1     00006 1     10002 1     55034 0     34711 1     22000 1     00006 1     11041 1
10,2020     61034 1     04754 0     34746 0     22000 1     40000 0     00006 1     11042 1     55034 0
10,2030     34746 0     22000 1     00006 1     11041 1     61034 1     04754 0     30001 0     64706 1

10,2040     04754 0     34712 1     55042 1     40000 0     55041 1     34711 1     34707 0     54001 1
10,2050     34711 1     00006 1     11042 1     55034 0     22000 1     00006 1     11041 1     55035 1
10,2060     61034 1     04754 0     31035 0     22000 1     40000 0     00006 1     11042 1     55035 1
10,2070     22000 1     00006 1     11041 1     55034 0     61035 0     04754 0     41034 0     64707 0

10,2100     04754 0     30001 0     04754 0     34707 0     54001 1     34746 0     00006 1     11042 1
10,2110     55034 0     22000 1     40000 0     00006 1     11041 1     61034 1     04754 0     44707 1
10,2120     22000 1     00006 1     11042 1     55034 0     22000 1     40000 0     00006 1     11041 1
10,2130     61034 1     04754 0     40001 1     04753 1     34725 0     54001 1     34707 0     55042 1

10,2140     40000 0     55041 1     34723 0     00006 1     11042 1     55034 0     22000 1     00006 1
10,2150     11041 1     55035 1     61034 1     04754 0     31035 0     22000 1     40000 0     00006 1
10,2160     11042 1     61034 1     04754 0     31035 0     22000 1     00006 1     11041 1     55036 1
10,2170     61035 0     04754 0     41036 1     64725 0     04754 0     30001 0     64723 0     04754 0

10,2200     44725 1     54001 1     34723 0     00006 1     11042 1     55034 0     56001 0     04761 0
10,2210     34726 0     54001 1     34723 0     00006 1     11041 1     61034 1     04754 0     56001 0
10,2220     04761 0     34725 0     54001 1     44723 1     00006 1     11042 1     55035 1     61034 1
10,2230     04754 0     56001 0     04762 0     34725 0     54001 1     44723 1     00006 1     11041 1

10,2240     61035 0     04754 0     56001 0     04762 0     31035 0     64744 1     64725 0     04761 0
10,2250     34711 1     54001 1     44750 0     55041 1     40000 0     55042 1     00006 1     11042 1
10,2260     40000 0     60001 0     04762 0     34711 1     22000 1     00006 1     11041 1     60001 0
10,2270     04762 0     34746 0     22000 1     40000 0     00006 1     11042 1     40000 0     60001 0

10,2300     04761 0     34746 0     22000 1     00006 1     11041 1     60001 0     04761 0     40001 1
10,2310     61041 0     04754 0     44711 0     55041 1     40000 0     55042 1     54001 1     00006 1
10,2320     11042 1     64726 0     04754 0     22000 1     00006 1     11041 1     64725 0     04754 0
10,2330     40000 0     22000 1     40000 0     00006 1     11042 1     64725 0     04754 0     40000 0

10,2340     22000 1     00006 1     11041 1     64726 0     04754 0     40001 1     04753 1     34711 1
10,2350     55042 1     54001 1     40000 0     55041 1     00006 1     11042 1     55034 0     30001 0
10,2360     04753 1     40000 0     00006 1     11041 1     61034 1     04754 0     40000 0     56001 0
10,2370     04753 1     00006 1     11042 1     55035 1     61034 1     04754 0     40000 0     56001 0
```

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OCTAL LISTING OF PARAGRAPH # 061, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

10,2400        04754 0     00006 1     11041 1     61035 0     04754 0     34725 0     61035 0     04754 0
10,2410        56001 0     04754 0     34745 0     00006 1     01001 1     40000 0     00006 1     00001 0
10,2420        04762 0     34726 0     64726 0     00006 1     01002 1     40000 0     00006 1     00002 0
10,2430        55034 0     04770 0     31034 1     64725 0     04761 0     34711 1     54001 1     00006 1

10,2440        02001 1     04753 1     34746 0     00006 1     02001 1     04753 1     40000 0     54001 1
10,2450        40000 0     00006 1     02001 1     04753 1     34746 0     00006 1     02001 1     04754 0
10,2460        34725 0     64713 0     56002 0     34746 0     00006 1     02002 1     55034 0     04770 0
10,2470        04761 0     41034 0     04762 0     34711 1     54001 1     00006 1     03001 0     60001 0

10,2500        04753 1     34746 0     00006 1     03001 0     60001 0     04753 1     40000 0     54001 1
10,2510        40000 0     00006 1     03001 0     60001 0     04753 1     34746 0     54001 1     00006 1
10,2520        03001 0     60001 0     04754 0     34725 0     64713 0     56002 0     34746 0     00006 1
10,2530        03002 0     55035 1     04770 0     30002 0     55034 0     04770 0     41034 0     04762 0

10,2540        41035 1     04762 0     34711 1     54001 1     00006 1     04001 1     04753 1     30001 0
10,2550        04753 1     34746 0     00006 1     04001 1     04754 0     30001 0     04753 1     40000 0
10,2560        54001 1     40000 0     00006 1     04001 1     04754 0     30001 0     04754 0     34746 0
10,2570        00006 1     04001 1     04754 0     34726 0     64744 1     56002 0     34725 0     64712 1

10,2600        00006 1     04002 1     55034 0     02605 0     04770 0     31034 1     04762 0     34711 1
10,2610        54001 1     00006 1     05001 0     04753 1     30001 0     04753 1     34746 0     00006 1
10,2620        05001 0     04754 0     30001 0     04754 0     40000 0     54001 1     40000 0     00006 1
10,2630        05001 0     04754 0     30001 0     04754 0     34726 0     00006 1     05001 0     04754 0

10,2640        30001 0     04754 0     34726 0     64744 1     56002 0     34725 0     64712 1     00006 1
10,2650        05002 0     55035 1     12654 0     04770 0     56002 0     55036 1     02660 0     04770 0
10,2660        31036 0     04762 0     31035 0     04762 0     34711 1     54001 1     00006 1     06001 0
10,2670        04753 1     34746 0     00006 1     06001 0     04754 0     30001 0     04753 1     40000 0

10,2700        54001 1     40000 0     00006 1     06001 0     04754 0     34746 0     00006 1     06001 0
10,2710        04753 1     30001 0     04754 0     40000 0     54002 1     34725 0     64713 0     00006 1
10,2720        06002 0     55034 0     04770 0     31034 1     04762 0     04224 1     02732 0  C: 02740 0
10,2730     C: 02744 1  C: 03033 1     34711 1     00006 1     54711 1     52727 1     10000 0     04770 0

10,2740        00006 1     52730 1     60000 1     04770 0     00006 1     54751 0     30001 0     40000 0
10,2750        60001 0     04761 0     00006 1     54751 0     40001 1     40000 0     60001 0     04762 0
10,2760        34725 0     00006 1     54751 0     70001 1     04761 0     34725 0     00006 1     54712 1
10,2770        60000 1     04761 0     34747 1     55036 1     34711 1     54001 1     34706 1     00006 1
```

```
OCTAL LISTING OF PARAGRAPH # 062, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

10,3000        54665 0       10000 0       55034 0       34746 0       56001 0       40000 0       00006 1       54665 0
10,3010        10000 0       61034 1       04754 0       34711 1       55034 0       40000 0       00006 1       54663 0
10,3020        20000 0       04762 0       32731 0       55034 0       03026 0       04770 0       00006 1       54663 0
10,3030        22000 1       00002 0       04770 0       44711 0       55034 0       00006 1       54663 0       24000 1

10,3040        31034 1       04762 0       34713 0       55034 0       00006 1       54663 0       26000 0       41034 0
10,3050        04762 0       34745 0       00006 1       54712 1       01000 0       40000 0       00006 1       54712 1
10,3060        00000 1       04762 0       34712 1       54001 1       34746 0       00006 1       54712 1       02000 0
10,3070        04761 0       34726 0       64712 1       54001 1       34725 0       00006 1       54712 1       03000 1

10,3100        04761 0       40001 1       04762 0       34712 1       54002 1       34711 1       00006 1       54713 0
10,3110        04000 0       04761 0       34737 0       54001 1       34725 0       64745 0       00006 1       54712 1
10,3120        05000 1       04762 0       30001 0       04762 0       34745 0       54001 1       34725 0       00006 1
10,3130        54712 1       00000 1       64725 0       04761 0       34713 0       55034 0       34663 0       54001 1

10,3140        34712 1       00006 1       50001 0       60000 1       04762 0       34707 0       60000 1       54000 0
10,3150        04770 0       60000 1       54000 0       04770 0       60000 1       54000 0       03160 0       04770 0
10,3160        04761 0       34733 1       55040 0       34726 0       54020 1       10020 1       03172 0       04770 0
10,3170        03174 0       04770 0       25040 1       03165 0       31040 1       60020 0       10000 0       04770 0

10,3200        04770 0       04770 0       34735 1       55040 0       34726 0       54022 0       10022 0       03213 1
10,3210        04770 0       03215 1       04770 0       25040 1       03206 0       30022 1       04761 0       31040 1
10,3220        04762 0       34736 1       55040 0       34726 0       54021 0       10021 0       04770 0       04770 0
10,3230        03234 1       31040 1       04762 0       03236 0       25040 1       03225 1       34735 1       55040 0

10,3240        34722 1       54022 0       30022 1       54023 1       54020 1       30020 0       30020 0       30020 0
10,3250        30020 0       30020 0       30020 0       30020 0       74722 0       40000 0       55034 0       34746 0
10,3260        70023 1       61034 1       04754 0       25040 1       10023 1       03242 0       03271 0       04770 0
10,3270        04770 0       31040 1       04762 0       25046 1       05010 0          @             @             @

10,3300           @             @             @             @             @             @             @             @
10,3310           @             @             @             @             @             @             @             @
10,3320           @             @             @             @             @             @             @             @
10,3330           @             @             @             @             @             @             @             @

10,3340           @             @             @             @             @             @             @             @
10,3350           @             @             @             @             @             @             @             @
10,3360           @             @             @             @             @             @             @             @
10,3370           @             @             @             @             @             @             @             @

THE ASSEMBLY WAS GOOD.   BINARY RECORDS FROM IT WERE WRITTEN ON LYNNWARD.
```

$$\frac{500000}{V}$$

$$a_b = \underset{(1.0000)}{\overset{\boxed{3200}}{\underline{\underline{(SF)}}}}(\Delta z)\left(\left(\frac{500000}{N_+^+} + \frac{500000}{N_+^-}\right) - 1\right)$$

$$SF = (.306)\left(\frac{N_+^- + N_+^+}{N_+^- - N_+^+}\right) =$$

$$\left(\frac{g}{3200}\right)$$